

# Indian Food Industry

A PUBLICATION OF ASSOCIATION OF FOOD SCIENTISTS AND TECHNOLOGISTS (INDIA)

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# **ASSOCIATION OF FOOD SCIENTISTS AND TECHNOLOGISTS (INDIA) MYSORE - 570 013**

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- \* Affiliated to the Institute of Food Technologists, Chicago, Illinois, U.S.A.
- \* The Association is a professional and educational organization of Food Scientists and Technologists, with its headquarters at Mysore.
- \* The chapters of the Association the association are located at Bangalore, Bhopal, Bombay, Calcutta, Delhi, Hisar, Hyderabad, Jabalpur, Jaipur, Jammu, Kanpur, Karnal, Kharagpur, Ludhiana, Madras, Manipur, Nagpur, Pantnagar, Parbhani, Pune and Thiruvananthapuram.

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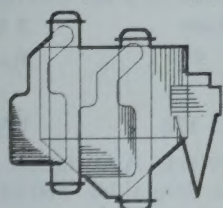
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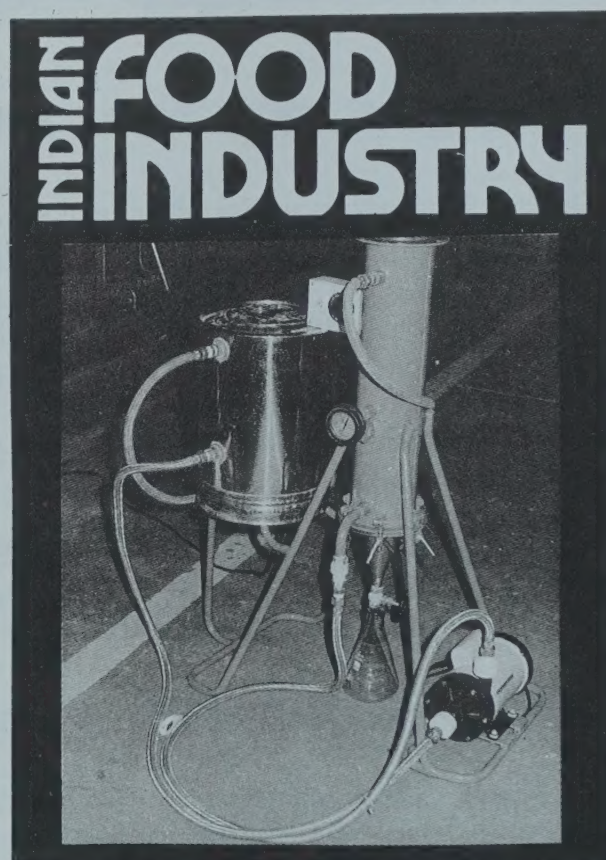
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Review articles, technology papers based on R&D work and reports on various aspects concerning food industry are welcome from food scientists and technologists from industry, research institutions and other related organisations. Contributors are advised to provide good quality illustrations in the form of charts and photographs along with the manuscripts. The Editorial Board reserves the right to edit the manuscripts in order to make them suitable for publication in the journal.

Food industries may send information (suitably illustrated with photographs) about their new products, machinery, business ventures and other developments, which will be published on the discretion of the Editorial Board.

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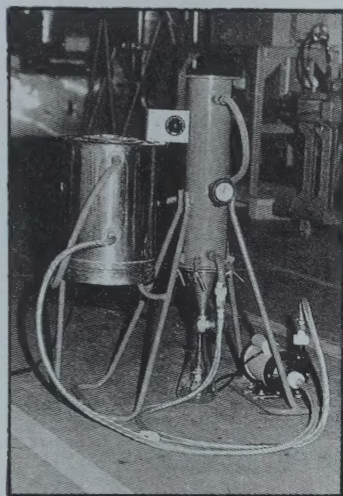
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# GOOD NEWS

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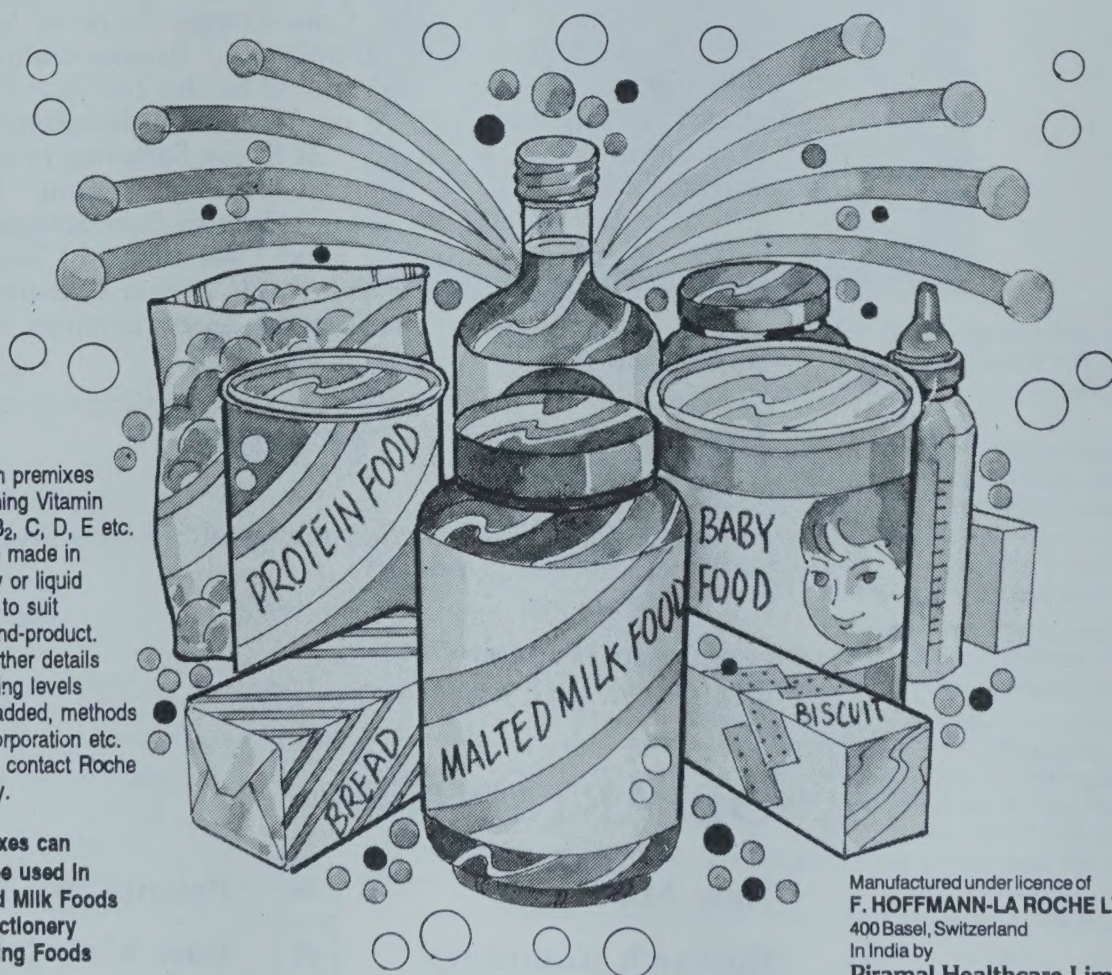
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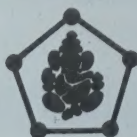
# EDITORIAL

*How strange! when I wrote my first editorial for the last issue I had never imagined that my next one will be the farewell one. But that is how it has happened. In the last general body meeting, an amendment to the existing bye-law was put forward that the Chief Editor, IFI should be a member of the Central Executive Committee and another amendment that one individual can have only one membership in the CEC which was passed. I continue to be a member of the CEC by virtue of my being the Immediate Past President. I had lot of ideas in improving the journal and they were slowly taking shape, but before I could put them into practice I am relinquishing the position of Chief Editorship. I wish the new incumbent all the best.*

*I take this opportunity to thank the members of the editorial board, advisors, staff of AFST(I), contributors, advertisers and all others without whose co-operation I could not have carried out by responsibilities as Chief Editor. I am sure you will continue giving the same co-operation to the new Chief Editor. I look forward to the continued patronage of our esteemed readers, authors, advertisers and the members of AFST(I) to the journal in the years to come.*

**Rugmini Sankaran**  
**Chief Editor**





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# INDUSTRY NEWS

## MPEDA in International Seafood Market

Live crabs, considered to be a value-added seafood delicacy, have been identified as a thrust export item from India due to their higher unit value realization. The Marine Products Export Development Authority (MPEDA) is currently focussing on various ways and means to boost the export of live 'mud crabs' available in abundance on the Indian coast.

Out of the commercially important edible crabs available in India, *Scylla serrata* and *Scylla tranquebarica* have tremendous export potential in view of their popular size, quality and texture of meat, and their fast growth rate in captivity.

However, live crab export from the country is not up to the mark, mainly because of poor packaging techniques and the consequent high mortality rate, say MPEDA sources. A mortality rate of about 20 to 25 per cent is observed in Indian consignments at destination ports, whereas the mortality rate is as low as 5 per cent in consignments from Sri Lanka, the sources said.

MPEDA, in its endeavour to boost exports of live crabs from India, had recently invited an expert team from the Singapore based MS Tong Kee Trading Corporation to train Indian personnel in crab collection, supply and exports. Three demonstration cum training programmes were conducted by the team at Kochi, Kakinada and Madras. These

programmes were attended by nearly 94 representatives who are active in the field of collection, supply and export of live crabs. Handling, packaging and transportation of live crabs and various techniques of fattening the live crabs in captivity were demonstrated in the programme.

The chief cause of the high rate of mortality of Indian crabs has been identified as the cardboard cartons presently being used for export of live crabs.

## Boosting Mango Export

Agriculture and Processed Food Export Development Authority (APEDA) has stressed the need to chalk out a well defined commodity promotional programme for mangoes, to stimulate consumers' appetite and boost exports.

Mr Gokul Patnaik, who till recently was chairman of APEDA, said that companies trading in mangoes and mango producing countries will benefit from a well-developed and executed promotional programme, which will see sales soar high. Further the demand for the product has to be developed through price promotions, recipes and some sampling. Mainstream buyers have to be induced to buy a fruit, that perhaps they have tested in an ethnic restaurant while travelling.

University of Agricultural Sciences visiting professor C.P.A. Iyer, on the other hand, advocated the total quality

management (TQM) approach for export of fresh mangoes. He said that the process should start right from the flowering stage and continue upto the final packing. An education programme on quality crop must be undertaken for all those involved in exports.

Further, he also favoured labelling of each fruit and developing brand names and adoption of adept marketing skills to boost exports.

Observing that in spite of increasing popularity and awareness of the fruit, mango has primarily remained a product targetted at the ethnic consumer, Mr. Patnaik pointed out that with Europe and North American markets still untapped and under-developed, these provided immense opportunities for countries like India to expand their base and explore these avenues.

Although India produces nearly 9 million tonnes of mango annually, its fresh fruit export hardly amounts to about 23,000 tonnes, valued at about Rs. 43.87 crores.

According to Mr Iyer, among the various reasons for this is India's exclusive dependence on *Alphonso* for fresh fruit export, though, in recent years, varieties like *Baganapalli*, *Kesar*, *Suvarnarekha* and *Totapuri* have been exported from Andhra Pradesh and Gujarat and *Dashahari* from Uttar Pradesh.

In many international markets, *alphonso* is almost synonymous with Indian mangoes but, this causes problems where there is a slump in production, and domestic demand and prices are high. Therefore the need arises for



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promotion other varieties which are produced in abundance.

There has been an increasing interest in the fruit and recently some major fruit companies like Dole, Chiquita, Del Monte and Calavo growers of California, and Tustin are entering the market in a big way.

Further, mangoes with famous brand names have found their way to previously untapped markets like Cleveland, Detroit and Atlanta, giving ample scope for exports to these areas.

Since a number of countries have taken up orchard plantation in a big way, production is also expected to rise dramatically. With increasing volumes, the prices are bound to dip as the notion of the mango being an expensive, exotic fruit will continue to fade amongst the larger blocks of US and European consumers. Mango may become more of a staple fruit in the market place, giving the needed scope for catering to increased demands.

With and increasing number of supermarket chains and departmental stores, as opposed too the traditional green grocers, seek to ensure their supply through direct contacts with growers and their associations, the increase in their level of international cooperation has important implication for exporters of fresh fruit from developing countries.

The growth in supermarkets, spurred on by changing shopping habits, with more emphasis on one stop shopping and large out-of- town superstores has meant that the supply of the fruit is becoming increasing channelled through large and sophisticated fruit handling companies in the world.

The growing favourable attitude towards consumption of exotic fruits is expected to see

that the market for mangoes would continue to grow in Europe as well as in North America.

Developing countries would do well to target the European market, where the total import of fresh mangoes is estimated to be around 40,000 tonnes, of which approximately 85,000 tonnes is supplied by CP producing countries.

## **India to Supply Packaging Materials to PepsiCo**

PepsiCo has identified India as a major source for supply of packaging material for the worldwide requirements of the \$ 70- billion multinational beverage giant.

The Indian counterpart of the company, Pepsi Foods Ltd., is likely to chalk up Rs. 350 crore exports during the current year, of which packaging material is expected to constitute nearly 60 per cent.

In addition, PepsiCo is making a conscious effort to shift the manufacturing base for some of its raw materials, packaging and key ingredients to India.

These products, in turn, would be supplied to destinations in Europe, the US, Africa, West Asia and South-East Asia.

The company has invested Rs. 75 crores in setting up a unit for the manufacture of high pressure moulding grade PET chips and pre-forms, especially for exports. The company plans to increase the capacity of this plant from 20,000 tonnes to 29,000 tonnes shortly.

PepsiCo International has tied up with M&G of Europe to bring proprietary technology into India and instal it in the 100-per cent export-oriented unit (EoU) for the manufacture of solid grade PET resin. These exports alone are expected to be in the region of Rs. 150 crores in 1996.

The company is also supplying high quality returnable glass bottles duly printed with the PepsiCo brands - Pepsi, Teem, 7 Up, Miranda - to countries in South-East Asia, Africa and West Asia.

According to sources, the company has also introduced high technology non-returnable glass bottles for PepsiCo brands, using the proprietary Owens Illinois technology for West Asian market.

The company is, at present, tying up with Indian glass units for the manufacture of these bottles as per international standards.

Even supply of paper cups used in fountain Pepsi operations are being sourced from India. These are being supplied even to countries like Japan.

Further, plastic crates are being manufactured in India by local units with technical support from PepsiCo for the international market. The company, is making an effort to exploit the advantage of the availability of cheap labour and low cost of raw materials to build up international supplies.

The company is doing a similar exercise with the restaurant chains Kentucky Fried Chicken and Pizza Hut. Packaging material like cardboard boxes are being exported to West Asia and Sri Lanka.

PepsiCo uses a fleet of 2,00,000 vehicles globally and its replacement demand is to the tune of 10,000 trucks every year.



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The company has tied up with local manufacturers to produce custom-built vehicles suited to their needs. In the first lot, the company has supplied 100 of these trucks to Tanzania.

## **Tarai Foods May Snap with BBLIL**

Tarai Foods Limited which has a marketing tie-up with the Indian company to sell the frozen vegetables, processed by Tarai Foods, under the brand name Green Valley proposes to snap ties with BBLIL, probably because of ConAgra taking a majority stake in Tarai Foods. ConAgra would like to market its own products and will not like BBLIL participating or interfering in the company's operations.

BBLIL has established a cold chain for marketing frozen peas, spinach, carrots, cabbage and other green vegetables. The vegetables are processed at Tarai Foods plant in Rudrapur, Nainital.

In another significant development, ITC Agro-Tech proposes to pick up 25 per cent stake in Tarai Foods Limited, taking the stake of the food processing giant ConAgra to 76 per cent in it.

Lambweston, a subsidiary of ConAgra, has already taken a 51 per cent stake in Tarai Foods. Through ITC Agro-Tech taking 25 per cent stake in the company, ConAgra has already signed an agreement with ITC Agro-Tech and plans to pick up a stake in it. Also, negotiations are on between Tarai and ITC Agro-Tech to pick up the equity.

While Lambweston paid around Rs 10 crores to Tarai Foods for picking up a 51 per cent stake, negotiations for

purchase of another 25 per cent through ITC Agro-Tech are currently on.

## **Chicken Feed Worries Mysore Poultry Farmers**

The rise in feed costs has hit poultry farmers. The prices of inputs like maize, soya and groundnut cakes have increased by almost 50 per cent over the last six months. With poultry feed alone constituting about 85 per cent of the input costs, farmers say that maintaining their poultry stocks has become difficult.

The price of maize (which constitutes almost 50 per cent of the poultry feed) has risen from about Rs 420 a quintal to about Rs 580 a quintal. The price of groundnut cake has shot up from about Rs 5,600 a tonne to about Rs 9,000 a tonne, and the price of de-oiled sunflower cake has gone up from about Rs 2,800 a tonne to about Rs 5,000 a tonne.

Farmers also complain that they are facing a short supply of inputs. "While earlier, we were facing shortage of a particular cereal, say maize or soya, today, we are facing a shortage of almost all the inputs required for making feeds" according to MR Rajashekara Gowda, president of the Mysore Poultry Farmers' Club.

Incidentally, of Karnataka's total of about 50 lakh layers (hens used for egg purpose), Mysore, with about 20 lakh layers, is the largest egg-producing district in the state.

Shortages and increase in input prices have been attributed to the increased demand for

soya and maize in the export market. The crop failure in the United States and China has resulted in an increase in demand for these commodities in the overseas markets.

Another inevitability of a fall in egg prices would be a shakeout in poultry farming, as small and marginal farmers with less than 5,000 birds will not be able to sustain their losses.

The real problem, according to experts, is the lack of price control mechanism. Farmers have no role in determining the egg prices, as this is left totally to the market forces. Farmers allege that the traders and middlemen take advantage of the perishable nature of eggs. Eggs have an average shelf life of about 20 to 30 days. Traders tend to stock up, when the prices are rising, while at the same time allowing the prices to crash, when they are falling. As a result, the farmers are, at times, forced to sell at prices where they would incur huge losses.

Experts say that for the development of poultry and for improving the farmers' lot, what is required now is the development of cooperatives on the lines of the Kaira system for milk. This would help the farmers have a greater say in determining the price of their produce.

Farmers also feel that the government should set up cold storages in the major egg-producing centres. This would help farmers hold on to their stocks. Poultry farmers also feel that there is immense potential for exports. Exports would also help in ensuring a better price for eggs in the domestic market.



## Export Cess on Black Pepper Suspended

The government has decided to suspend the levy of export cess on black pepper until further orders from August.

The government notification to suspend the export cess levied by the Spices Board covers four more products, namely, cardamom, saffron, spice oils and oleoresins, according to Spices Board Officials. The exemption of the export cess on these products had expired on March 31.

The Spices Board is levying a 2 per cent export cess on all spices and spice products. However, to make the price of some of the items internationally competitive, the levy of cess was suspended in the last few years.

Exporters had pointed out that the uncertainty regarding the export cess was affecting the export performance, particularly that of black pepper. The exporters were unwilling to enter into forward contracts because of the delay in the decision from the government.

Unlike in the past, when exemptions were given for specific periods, the present decision has exempted these products from the levy of cess until further orders. This would go a long way in reducing the uncertainty on the export front.

## Non-fat Chocolate Bar Possible

In laboratories across the United States, scientists spurred by a growing consumer revolt over the risks of a high-fat diet, are toiling to reduce chocolate's

fat content and perhaps even concoct an entirely fat-free chocolate bar. The lure of guilt-free chocolate stirs considerable passions.

Half the women surveyed in the 1995 book *Why Women Need Chocolate* said chocolate was more important than anything else. Yet an unfavourable light on the some time dazzlingly high fat content of chocolate has nudged some to choco-abstinence.

Recent months have given US consumers the first chance to sample some of the new lower-fat chocolates and initial sales have been strong.

Experts say that a non-fat chocolate bar is theoretically possible, chiefly by reducing or altering the cocoa butter that acts as the glue bonding chocolate's powdery ingredients, including cocoa and sugar. One approach is reducing the space between the powdery ingredients, which are much like basketballs packed into a room, explained Gregory Ziegler, who is researching the subject as a Penn State University professor of food science. If these balls could be reduced comparatively to the size of tennis and golf balls, the powder would need less fat to hold them together.

For a completely non-fat chocolate bar, however, chemists would need to concoct a non-fat bonding agent to replace cocoa butter. Ice-cream has had more success with fat-free variants because frozen water can substitute for fat, which luxury chocolate researchers obviously do not enjoy.

Another challenge is mimicking the chocolate's melt-in-your-mouth feel. "The essence of chocolate is the mouth feel and it comes from the fat," said Kathy Kempke, a market analyst at Grace Cocoa Chocolate Americas in Milwaukee.

Even if chemists devise a fat-free cocoa butter substitute, some experts say that it will ultimately falter because the body, conditioned by doting parents from an early age, expects full-of-fat chocolate to pump calories into the body, which are necessary in the short term.

"The brain made us like chocolate because of the fat," said Dr Linda Bartoshuk, an expert on tastebuds at Yale University School of Medicine. "If you take out the fat, the brain will quickly catch on."

Yet with US chocolate lovers already forking out tens of millions of dollars for lower-fat chocolates, the quest for guilt-free chocolate continues with an uncertain prognosis. "What is that thing that they're always looking for? The Holy Grail. That's what it may be, because part of the liking for it is from the presence of fat," Ms Bartoshuk said.

## Coca-Cola India Moving from Mumbai to Delhi

Coca-Cola India is in the process of shifting its headquarters to New Delhi from Mumbai.

The CEO of the company, Mr Richard Nicholas, has already shifted to the Delhi office along with his immediate staff. The rest of the senior officials and staff will also be in Delhi by the end of this year.

The main reason to shift the company's base to Delhi has been attributed to the high real estate cost in Mumbai.



## Diet Coke and Diet Pepsi on Their Way to India

Diet Coke and Diet Pepsi may finally come to India now, with a draft modification in the Prevention of Food Adulteration Act (PFA) allowing its manufacture here. Earlier, the proposal for making the diet drinks in India had got stuck awaiting suitable amendments to the archaic PFA Act, 1954.

Under the PFA, a vital ingredient in diet drinks, Aspartame could not be added to cola, as there was no provision for this under the old PFA Act.

In a draft notification recently, the Ministry of Health has clarified that the sugar substitute Aspartame, used in the diet drinks may be added to carbonated water in certain proportions after a final amendment of the rules in PFA by an official Gazette notification.

Diet Coke and Diet Pepsi are one of the biggest sellers for soft drink giants Coca Cola and Pepsi Cola internationally constituting more than 20 per cent of their cola sales. Both Pepsi and Coke had received permission to sell their other soft drink brands long before, including regular Coca Cola and Pepsi Cola, Fanta, 7Up, Mirinda and Teem.

The draft notification has been bouncing between the Ministry of Food Processing, the Ministry of Health, and the Ministry of Law, as an amendment to the PFA rules requires the involvement of all these ministries.

It reads as follows : "In Rule 47 of the principal rules, (a) sub-rule (1), the following shall be added, namely Aspartame

(methyl ester), carbonated water (700 parts per million), Acesulfame-K (300 parts per million)."

The notification adds a proviso saying, "Provided that sacharin sodium or aspartame or acesulfame potassium may be sold individually as table top sweeteners and may contain carrier or filler articles with appropriate label declarations."

Both Aspartame and Acesulfame, are the two essential ingredients which go into the manufacture of diet colas, the fad drink among health-conscious consumers. The normal cola drinks containing sugar have roughly 100 calories, compared to nearly zero calories in the diet drinks.

Internationally, the regular colas are targeted at teenagers, while the diet drinks are for the other consumers. But both types of cola drinks are priced similarly.

Coke and Pepsi spokespersons declined to comment saying the "the final permission is yet to come." The final permission through an official notification may take some more time, before the two soft drink companies can contemplate starting production.

## Role of R&D / Industry in Research Projects

India's scientists, closetted for decades in cash-starved laboratories and often under pressure to deliver without incentives, are reaching out to industry with aggressive market savvy and beginning to gain world recognition.

Mr Asis Datta, rector and professor of Biochemistry and Molecular Biology at the

Jawaharlal Nehru University in Delhi, said that unlike Western countries where the Government and the industry were actively involved in developing a competitive research platform through continuous flow of funds, in India that kind of interaction was not in vogue. Most of the research labs in the country have to find ways to generate their own funds since funds provided by the Government are either insufficient or their flow inconsistent.

Mr Datta said that the industry could play a very positive role by funding research projects which were need-based and had wide applications. 'Presently, about 60 percent of research we do have very few applications,' he said. The situation, he said, could be improved if industry came out with the areas where they needed research and development, he added.

"Such endeavour will lead to the creation of strong indigenous, self-reliant base for biotechnology research and development."

Biotechnology in the Indian context, could create wealth for the nation, improve health care systems, increase agricultural output and provide cleaner technologies for sustainable development. "With its present research infrastructure in terms of skilled scientists, India could become a major economic power based on biotechnology," Mr Datta predicted.



## Fungus Fears Dampen Wheat Exporters' Hopes

India's wheat exports could be increasingly hit by fears about the presence of karnal bunt fungus, according to traders and analysts.

Poland, recently barred a cargo of 23,500 tonnes of Indian wheat after tests showed it was infected with karnal bunt fungus. Turkey and Morocco rejected shipments of Indian wheat after detecting the fungus.

The moves came after the US Department of Agriculture in March suspended exports to 21 countries after the discovery of wheat seeds infested with the fungus. The US Government's decision sent tremors through world wheat markets.

Karnal bunt, also called partial bunt, is a fungus that affects wheat and triticale, a hybrid of wheat and rye. Karnal bunt is an inherent fungus in the crop that traders find it difficult to tackle.

The fungus, named after a town in the northern Indian state of Haryana, poses no health hazards to humans. But, infected plants produce less grain with poor quality.

Traders said that about 1,50,000 tonnes of wheat exporters were under dispute, with some buyers insisting on the inclusion of a karnal bunt-free clause after agreements had been signed.

Analysts said that only wheat infested with more than three per cent fungus would qualify for rejection. "In Indian consignments it is less than 0.5 per cent," said one analyst.

He said that the karnal bunt issue had been blown out

of proportion. "But it will badly hurt Indian exports."

The Agricultural and Processed Food Products Export Development Authority (APEDA) had not issued licences for the 1.13 million tonnes of wheat authorized for export in 1996-97.

The government has asked exporters to comply with strict quality controls and give a declaration that they would fulfil the phytosanitary needs of the importing countries.

## India Emerges as Top Dairy Nation

India has emerged as the world's top dairy nation with the milk production crossing 70 million tonnes (MT) in 1995-96 (April- March). The US was the top milk producer with an output of about 68 MT. India's milk production last year was 63.5 MT. Announcing this at Anand, Gujarat, recently the National Dairy Development Board chairman Verghese Kurien said, "these achievements demonstrated that with the right stimulus, our nation's agricultural output could accelerate rapidly." He was speaking at the annual general meeting of the National Cooperative Dairy Federation of India. (NCDFI).

Mr Kurien is also the chairman of NCDFI. The cooperative movement played a significant role in improving the milk production through technology missions.

India's milk production was only about 20 MT when the government started 'Operation Flood' programme through the NDDB in the early 1970s. In the past 26 years, the programme

has led to more than trebling of the milk production.

Mr Kurien said that NDDB invested over Rs 1,750 crores under 'Operation Flood' which created an additional output of Rs 35,000 crores during 1995-96. "Such an input-output ratio is perhaps unmatched by any other rural development programme", he said.

## INDAL Enters Tolling Pact With HINDALCO, DUBAL

Indian Aluminium Company Ltd (INDAL), has entered into tolling agreements with Hindustan Aluminium Company Ltd (HINDALCO) and Dubai Aluminium (DUBAL) for conversion of its aluminium into metal.

Though Mr Tapan Mitra, Vice chairman, and Managing Director of INDAL, refused to divulge names of its tolling partners, industry sources said that the company had first approached National Aluminium Company Ltd (NALCO) seeking use of the latter's smelting capacity to convert alumina produced by INDAL before clinching a deal with HINDALCO.

HINDALCO had recently expanded its smelting capacity and at the same time had been on the lookout for alumina to feed its expanded smelting capacity and, therefore, the tie-up between HINDALCO and INDAL would be of mutual benefit.

Meanwhile, the partial re-energisation of smelters at Alupuram during the current



year and shifting a part of the potline from Belgaum to Hirakud, INDAL hopes to produce close to 30,000 tonnes of metal in-house. Its aluminium recycling plant at Taloja, Maharashtra, is also close to commissioning and is expected to add another 25,000 tonnes of metal. This would further fulfil the need for metal for INDAL's substantial downstream capacity.

## BASF to Manufacture New Range of Insecticides

BASF India will be manufacturing a new range of insecticides, cypermethrin, at its Thane plant involving a total investment of Rs 6 crores.

The insecticide will be commissioned in 1997. Besides this, BASF will invest Rs 3 crores in the manufacture of a herbicide 'Bavistin' in liquid form at its Thane plant. Bavistin is applied mainly to paddy crops. The company manufactures Bavistin in powder form at present which is exported to BASF AG.

BASF has major expansion plans involving an investment of around Rs 60 crores at its plants at Thane and Mangalore, to be completed over a period of two years.

Other investments by BASF include Rs 12 crores to double capacity of polystyrene to 7,500 per annum at Thane, Rs 3 crores towards setting up facilities for Tamol liquid used in the construction industry, doubling dispersion capacity at Mangalore to 18,000 tonnes at a cost of Rs 15.5 crores, Rs 1.5 crores for manufacturing Helizirin pigments used in the printing industry.

## Financial Aid for Quality Upgradation

The Spices Board is presently implementing the following grant-in-aid schemes for improving/upgradation of quality of Indian spices.

1. Scheme for payment of grant-in-aid for setting up/upgradation of quality testing laboratories by spices exporters.
2. Scheme for payment of grant-in-aid to spices exporters for setting up facilities for monitoring pesticide residues in spices/spice products.
3. Scheme for payment of grant-in-aid for adopting ISO 9000 quality control system in spice units.

As these schemes were approved for implementation during the VIII Plan Period, ending by 31st March 1997, species exporters may utilize the schemes and avail the grant-in-aid before 31st March 1997.

## Quantitative Import Curbs on Chocolates to be Lifted

A notification would be issued shortly to remove quantitative import restrictions on certain broad categories of items including figs, apricots, coconut milk powder, chocolates and other food preparations, biscuits and wafers, coconut cream, rubber items, tyres for bicycles, floor coverings and mats of rubber, leather gloves, articles of leather used in machines or mechanical applications and tableware or kitchenware of porcelain, china

and ceramics. These categories will be shifted either to the Open General Licence list or be available for import through Special Import Licences (SIL).

These groups of items under the harmonised system of classification include the 20 products for which Bangladesh had sought easier access into the Indian market.

The proposal for easing import restrictions had been discussed with the Commerce Ministry officials at New Delhi during the visit of the Bangladesh Foreign Secretary recently. A list of 50 items had then been handed over by the Bangladesh delegation for which tariff concessions were sought. The Indian side had then given an assurance that concessions on 20 items will be given within a week.

In the case of other items, government's approval was to be sought and concessions on these were to be granted in the second phase. The third issue of removing quantitative restrictions was also discussed and an assurance was apparently given on this score as well.

The decisions taken now on removing the quantitative restrictions on selected import items were thus a follow-up of these discussions. At the same time, these assumed greater significance, since these would be applicable not only for Bangladesh but would also result in a general easing of import curbs on these categories of products.

## Coke Romps Home in Atlanta

Coke, the world's largest beverage company and Atlanta's corporate king, doled out more



than \$ 40 million to become the official Olympic beverage.

Coke is spending a reported \$ 250 million worldwide in Olympic advertising. And it seems to be working. A recent study indicated the number of consumers identifying Coke as the Olympic soft drink sponsor had doubled since Barcelona in 1992.

## TN to Allow Sugar Mills to set up Distilleries

The Government of Tamil Nadu is considering allowing of Sugar Mills in the Co-operative and public sector to set up distilleries and manufacture rectified spirit.

The mills could also start down-stream chemical industries (captive units) for the manufacture of chemical products utilising the rectified spirit produced in their distilleries.

Orders had been given for the export of 4.33 lakh metric tonnes of molasses, which was anticipated to be a surplus after meeting the local demands by the 33 Sugar Mills in Tamil Nadu.

Molasses is the basic raw material used in distilleries for the manufacture of alcohol.

It is also used in the manufacture of cattle feed, poultry feed etc. and as a binding material in foundries, by about 400 licensed small users in the State.

## Banana Cultivation Needs Government Assistance

Banana is said to be the world's oldest fruit and some say it is the 'apple of paradise'. This seedless fruit is quite cheap and delicious compared to other fruits. In fact, it is a boon to people who suffer from constipation, who are very prone to Hemorrhoids (piles). However, this fruit will no longer be cheap or easily available if the Government doesn't take interest in encouraging the growers by using the latest techniques.

In the Bellary district nearly five hundred acres of land is used to grow this fruit, with Kampli, Kamalapur and Hospet taking a major share in the production. Both green banana and sugandhi banana are grown here. The sugandhi variety is more nutritious, while the green variety is said to be allergic to some asthma patients.

However, the scene has changed considerably recently and the poorman's fruit is all set to become a luxury, if the risks involved in harvesting it are not tackled immediately. The main drawback of this crop is, it neither tolerates wind nor heat. This year due to heavy winds, banana crop worth crores was destroyed. It is not a new thing for the growers. Cyclone leads to devastation of the crops once in 2 or 3 years, leaving the farmer penniless.

As per the studies conducted at the Agricultural Research Station, Kathalager, Karnataka, intercropping can be done with soyabean and redgram in the main lead

without affecting the banana yield.

The only way to stop the destruction is to put up the wind breakers. As this is a commercial crop it doesn't have marketing problems. But unless and until the Government establishes a research centre in this area, the farmers are likely to give up this crop. It is high time that the Government takes serious steps and provides technical infrastructure and timely guidance, to save this precious fruit from extinction.

## India will be the Top Rice Exporter

India will emerge as the world's number one producer and exporter of rice within 10-15 years, according to two top agricultural scientists.

"It is an optimistic projection but India can do it because it has the required infrastructure, human resources, inputs and right policies", said Indian Council of Agricultural Research Director-General R.S. Paroda.

Agreeing with him, at a joint meeting, International Rice Research Institute (IRRI), Manila director general George H.L. Rothschild said : "India is ahead of other countries in the game to produce more rice. India will play a crucial role globally in meeting the demand of rice".

Currently, India has the world's largest area under rice cultivation (42.3 million hectares) but China is the no. 1 rice producer.

With last year's export of 5.5 million tonnes (MT) of rice, India is just behind Thailand as the world's no. 2 rice exporter.



Mr. Paroda said a target to produce 94 MT (current output 81 MT) of rice has been set for the Ninth Plan period (1997-2001). Now the average national rice output has increased to 2.5 tonnes per hectare (tha) from 1.3 tha in the 1960.

However, the average yield was over 5.5 tha in the irrigated regions of North India.

The average national yield has to be increased to 3.5 tha to meet the new target.

After China, India is the second country to develop its own hybrid varieties. India has released 7 high-yielding (15 per cent more) varieties in the last two years. About 60,000 hectares are now cultivated with hybrid rice and about 2 million hectares may be brought under it in four years, Mr. Paroda said.

## Effect of Union Budget for 1996-97 on Oilseeds Production

The Union Budget of 1996-97 has dealt a serious blow to the solvent extraction and vegetable oil industries and will be counter-productive to oilseeds output as well as the exploitation of non-traditional oil resources.

The relevant proposals in the Budget included the reduction of import duty on edible oil from 30 per cent to 20 per cent, withdrawal of the money credit scheme on use of solvent extracted oils in vanaspati, reduction of import duty on industrial oils from 50 per cent to 40 per cent and the withdrawal of the money credit scheme for the use of solvent

extracted non-edible oils in soap manufacturing.

The gap between demand and supply of edible oils as assessed by the ministry of civil supplies for the current year was six to seven lakh tonnes, whereas about one million tonnes of edible oils had already been imported from November 1995 to August 1996. The quantity might go up to 1.5 million tonnes by the end of the year, and valued over Rs. 3,000 crores due to a further reduction of import duty.

There was a serious risk of the depressed edible oil prices discouraging oilseeds production in the country, and India would be forced to go back to the pre-1989 era of low production and large annual imports of oil.

## India to Exploit Krill Resources in Antarctica

The possibility of commercial exploitation of krill resources in Antarctica by India will be explored by the Government and the industry, with India's first expedition to the continent for a scientific assessment of krill resources throwing up encouraging factors.

It would follow the report prepared on the possibility of exploitation of Antarctica krill resources, based on the data brought in by the Indian expedition and results of the follow-up scientific work now on in different laboratories in the country.

Krill closely resembles the conventional prawn found in tropical waters, but was more soft-shelled and fragile. Brick-red in colour and about 60-mm adult size, it was

exploited commercially from the seventies, mostly in the Atlantic part of the Antarctica Ocean by strategically located fishing countries, using the islands in the region as base support.

According to Dr. M.K.R. Nair, Director of the Kochi based Integrated Fisheries Project, there were abundant krill resources, estimated to be around 100 to 500 million tonnes, which was one of the positive features for any commercial venture by India to tap the species. Application of krill meat in aquaculture sector as feed and familiar processing techniques were other positive features, he pointed out.

## 24 Sugar Factories to be Set Up in Karnataka State

The Centre has granted permission for establishing 24 sugar factories in Karnataka, Minister of State for Sugar Umesh V. Katti told Legislative Council.

Replying to a question from independent member K.C. Puttasiddashetty, he informed that of the 24 factories sanctioned, one would be in the public sector, eight in the co-operative sector and the rest in the private sector.

The Minister assured the members that the Government had taken all the precautionary measures to prevent problems in respect of sugarcane crushing. The Government had already held discussions with the officials, he added.



## Bill to Regulate Oil Palm Output

A Bill to regulate oil palm production and management is under consideration of the Karnataka Government.

The Government proposes to form a statutory body for fixing prices and zonalisation of factory in order to regulate the quality and prices of seeds and oil.

However, due to the GATT agreement, other countries have been dumping oil palm at a lower price and India could not compete with these nations.

The Government was facing a dilemma as if the factories give a higher price to farmers to encourage oil palm cultivation it will result in higher cost of production leading to increase in oil prices.

The demand for palm oil in the country was 100 lakh tonnes and the Governments, both at the Centre and the State, were spending crores of rupees on oil palm cultivation. Yet the country is facing a deficit in palm oil production.

## Poisons in Baby Milk Powder !

Five popular brands of baby milk powder in Bangalore were found to be contaminated with pesticide residues above the maximum residue limit (MRL), during 1991-92, according to studies conducted by senior scientists at the Indian Institute of Horticultural Research. The milk powders were of different brands manufactured in Maharashtra, Gujarat, Punjab, U.P and Karnataka States.

Strong evidence suggests that DDT use for malaria control definitely increases DDT levels in bovine milk, fatty foods and breast milk of mothers living in that particular area.

Disturbingly, of the 30 samples of bovine milk collected from five main dairies in Bangalore, 83.3 per cent samples were contaminated with organochlorine insecticide residues also. 80 per cent of the samples were contaminated with hexachlorocyclohexane residues to the prescribed mrl.

This widespread and high contamination of milk and baby milk powder with toxic insecticide residues is bad news because organochlorines are acutely toxic and nerve poisons. They have accumulative effects leading to cancer, blood diseases, nerve damage and reproductive problems. The most widely used organochlorine insecticides are DDT, Aldrin, Endrin, Dieldrin etc. Chronic poisoning by them could lead to abnormal liver and kidney functions, hypertension, abnormal brain function, twitching and seizures.

Senior Scientists at the IIHR, namely Dr. M.D. Awasthi and Dr. A.K. Ahuja have also warned that in the case of baby milk powder the pesticide residues which are hard to degrade may have entered even into the baby's system over a period of time right from birth and may cause health hazards.

This is not an isolated study. Scientists at the Gujarat Agricultural University, tested 41 samples of baby milk powder and sixteen samples of infant food, manufactured in Gujarat, New Delhi and Maharashtra and monitored them for HCH and DDT residues during 1988-89, 1990-91 and 1991-92. Among the three states, Gujarat indicated the maximum levels of HCH and DDT, while HCH and DDT residues were above the MRL in

five and ten baby milk powder samples, respectively.

Residues of several chlorinated insecticides were also found in 50 to 60 per cent of baby milk powder manufactured in Gujarat, compared to Bombay, Rajasthan and New Delhi.

The Gujarat study (reported in the Journal of Food Science and Technology) also found that in five samples, the ADI for DDT computed for a three-month old baby weighing approximately 5 kg and consuming 875 ml (5 x 175 ml) a day, exceeded the maximum ADI 0.02 ng/kg body weight fixed by FAO/WHO.

The scientists namely, M.F. Raj, B.K. Patel, J.A. Patel and P.G. Shah remark that the presence of HCH and DDT residues in baby milk powder / infant food, considered to be a rich source of nutrition for infants, is a matter of serious concern. The main reason for such contaminants is the contaminated animal feeds which result in the chemicals showing up in bovine milk. They have suggested that the current annual consumption of HCH and DDT in agriculture and public sectors must be restricted or altered with safe chemicals for minimising pesticide residues in food commodities.

The case against the use of baby milk powder is strong indeed. Consumers either have to insist on getting uncontaminated baby milk powder, or switch to alternative nourishment, such as breast milk for the first four months, and then supplements like mashed potato, bananas, ragi mix etc. says Dr. Shirdi Prasad Tekur, paediatrician and member of the Community Health Cell.

The National Institute of Nutrition has brought out several tasty and nutritious infant food recipes which would



be safer than contaminated market infant foods.

## India may have to Import Foodgrains by Decade-end

India may have to enter the international market on a sustained basis for import and export of food grains to provide greater food security, according to Planning Commission sources.

According to the projections of the aggregate demand and supply of food grains during 1995-2005, the country may have an annual deficit of upto four million tonnes, but may have surpluses in good crop years.

In the long run, however, it is likely that with improved agricultural productivity and falling growth rate of population, the country may become a net exporter of food. This would require the establishment of the institutions necessary for international trade in such products.

The import and export of food grains will have to be regulated through tariffs and taxes to be determined by an independent tariff commission.

They said tariff commission was expected to be guided by the domestic foodgrains situation, thus taking into account the shortages and surpluses.

According to sources, a relatively freer international trade in food grains will help establish a single common market of food grains in the country by creating a more active private market within the country.

## Using Genes to Manufacture Food

The first, genetically-engineered food has gone on sale in British shops making biotechnology big news and, potentially, big business. The first commercially available product, tomato puree, has been developed by a biotechnology team from Zeneca using a specially researched, slow-ripening tomato.

This tomato puree / paste is the first product to gain approval for food use in the UK and USA. And it claims to be cheaper than the equivalent made from conventional tomatoes.

The UK government's Advisory Committee on Novel Foods and Processes (ACNFP) and the Food Advisory Committee (FAC) have approved its use without any special labelling requirements. However, supermarkets selling the new tomato products are voluntarily using the labelling 'produced with genetically modified tomatoes' as a way of providing consumer information. So far, the genetically-modified (GM) tomatoes have not yet been approved for sale in Britain.

British scientists are also claiming to have made the world's first beer produced by gene technology. This has been approved for sale but it is not yet produced in sufficient quantities. The beer, Nutfield Lyte, is a low-calorie product that contains about one per cent more alcohol (by volume) than beer made with unmodified yeast. Produced by the Brewing Research Foundation International, it uses a GM brewer's yeast that carries an extra gene that helps break down the large sugar molecules

(dextrins), which natural yeast cannot degrade ; releasing glucose that the yeast ferments into alcohol.

The first approval of a GM food product anywhere in the world was Gist-brocades' baker's yeast that was approved for food use in the UK in March 1990. This yeast produces carbon dioxide more quickly than conventional baker's yeast by using genes from a sister strain, resulting in production of around 30 per cent more carbon dioxide during dough fermentation than it normally does.

Approval has also been granted in Britain for use of oils made from GM oil seed rapes and GM soya and for the replacement of the cattle-based enzyme, chymosin, in cheese production. Inevitably, there are controversies over new and untried food ingredients, but time and money has been invested worldwide in the quest for techniques that produce items quicker and enable more people to eat at reasonable cost.

In Britain, Zeneca is responsible for a new food ingredient that has already gained considerable success. Its subsidiary, Marlow Foods, manufactures and markets Quorn myco-protein - a food that is high in protein and low in fat.

## All Natural

There is something about the word natural or herbal that inspires a feeling of safety. Now that manufacturers know this belief of the consumer, hundreds of products marked natural or herbal are jostling for space on shop shelves. This includes cold remedies, sleeping doses, shampoos, hair dyes, skin creams, weight loss aids and mysterious pills called energy



boosters. The faith in such products is stronger in India where we are already familiar with ayurveda and home remedies.

However, blind faith in the safety of products marked herbal is misplaced. It is a common belief that there is no fear of side-effects and adverse reactions from anything natural. Mother Nature gives no such guarantees. Poison ivy, marijuana and opium are all herbs and snake poison is 100 per cent natural! Even a kitchen remedy that your grandmother safely used in mild doses can backfire when taken in a concentrated commercial capsule. Nutmeg is one example. Although natural and commonly used in cooking, pure nutmeg powder can cause severe headache, cramps, nausea and even hallucinations.

Obesity, sexual dysfunction and infertility are some problems which tempt desperate people to try "all-natural" treatments advertised in magazines. The ingredients sound familiar and safe, but when they are taken for months, there is no telling what they will do to your blood pressure, liver or kidneys. Mental side-effects like anxiety and depression can show up as well. The worst danger arises when people who have chronic conditions like diabetes persist with bogus natural cures and let their illness get out of hand.

If herbal medicine is a genuine science, why are herbal products in the market sometimes risky? That is because they do not come under standard drug regulations.

Moreover, the safety of herbal products prepared in backyard units may not be checked out, especially for use by pregnant women, diabetics or hypertensives. Most carry no warnings of side-effects or contraindications, creating an

impression that anyone can take them without a second thought.

Of course that does not strike out all herbal medicine. Scientists suggest that people who opt for it should take it from a qualified person and ask to be regularly monitored while on it.

## **Sugar Mills should not Suffer for Government Delay : HC**

Benefits under the sugar incentive scheme should not be denied to a petitioner if the government has delayed in issuing him a licence under the scheme, the Delhi High Court has ruled.

The 1993 scheme affects 21 new and existing sugar mills, allowing them to use the money generated through higher free sale quota for repayment of loans taken for expansion of projects from financial institutions.

The court has acted on a petition by Hanuman Sugar Mills of Uttar Pradesh.

The case was heard a number of times by the court for the two years.

At most times, the standing counsel for the Central Government at the high court, had repeatedly sought postponement of the case on the grounds that the Cabinet secretariat was looking into the matter and was collecting information from various departments.

In this regard, the court observed: "The petitioner cannot be made to suffer for delay occurring at the hands of the respondents".

The court further said the delay in the grant of the letter of intent is not attributable to the petitioner.

Thus, the petitioner cannot be denied the benefits to which it may be entitled to under the scheme, on the grounds that the Lol was issued after March 31.

Saying so, the judges declared that the Lol issued on June 29, 1994, would be deemed to have been issued before March 31, 1994.

The judges also observed that the cabinet secretariat was seeking information from various government departments but none from the petitioner. So, the petitioner had nothing more to declare. Thus, the delay is entirely the government's, the judges ruled.

## **Beer Consumption on the Rise in Delhi**

Delhi is becoming one of the largest market for beer in the country, as total beer sales have gone up by nearly 50 per cent in the first eight months of the year. Indian Made Foreign Liquor (IMFL) consumption, however, has come down by 18 per cent. According to sources in the excise department, liquor vends in the city sold a total of 2.2 crore beer bottles in the first eight months. Beer sales in the first half of 1994-95 totalled 1.46 crore bottles. The total consumption during 1994-95 was estimated around 2.2 crore bottles.

Beer consumption in the city has seen a major rise ever since the Bharatiya Janata Party took charge of the Delhi government.



While the beer consumption in Delhi was put at 1.58 crores in 1993-94, the total sales are likely to cross the two-crore bottles mark by the end of the year.

Explaining the rise in beer consumption, officials said, the trend is an outcome of the Delhi Government's liquor policy, who encouraged drinkers to shift from liquor to beer. Officials indicated that while the city government has brought down the excise rates in beer, IMFL brands have been made costlier owing to higher excise rates.

The rise in beer consumption is despite the Delhi government's persistent "no" to the pub culture in the city. Though beer is served in several restaurants in the city, a bottle is priced around Rs. 70 per bottle while the prices range between Rs. 18 to Rs. 30. Because of the disparity in prices at restaurants and liquor vends, the capital was considered an ideal market for canned beer. Priced at Rs. 40 for a 500 ml can, Strohs is one of the most popular brands in the city, and it is likely to be one of the best sellers during winter.

## Champagne from Mangoes, Bananas

Biotechnologists of one of India's leading producers of alcoholic beverages have made champagne from fruits like

bananas and mangoes. They claim that India could storm the world champagne market with stuff made from tropical fruits using the technology they have developed.

"Entry of carbonated wines based on tropical fruits will revolutionise the market," said Dr. U.V. Singh, chief biochemist at the Kedia Castle Delleon Industries located at Durg district in Madhya Pradesh. He said that his team has successfully developed technologies for making carbonated wines and brandies from tropical fruits, "preserving the aroma and flavour of the original fruits in the final product".

The fruits which have been used for making champagne include bananas, mangoes, guavas, pineapples, papayas, peaches, pears, lichis, locats and plums. The technology developed involved the use of certain enzymes to clarify the fruit juices to obtain a clear and transparent liquid.

The liquid is then subjected to low temperature fermentation with the help of a slow growing species of yeast to prepare wine. "Wines thus prepared when distilled and matured gave good brandies preserving taste of original fruit". To prepare carbonated wines like champagne, the wine was fermented in closed containers, and matured at low temperatures, he said.

Dr. Singh said his team has produced champagne from

tropical fruits in small quantities in the laboratory and the process will eventually be scaled up. Currently, fruits produced in India are consumed as such as juices while several thousand tonnes of unused fruits go waste due to lack of facilities to preserve them.

## Pomash Foods Forms Technical Tie-up with Italian Firm

Pomash Foods Ltd (PFL), which is setting up a Rs. 16.50 crore project at Raigad to manufacture fried pellets, has entered into a technical collaboration with Pavan Mapimpianti Spa of equipment and knowhow for the plant, which will have a total capacity of 2,628 TPA. The company will manufacture pellets from wheat flour and other starches. PFL is planning to cater to the growing demand for raw food pellets in the South Asian and West Asian markets apart from Indian markets. Dr. T. K. Food Consultants will be looking after the erection, implementation, commissioning and normal operations of the plant. Moreover, the Italian partner will be subscribing nine per cent of PFL's equity capital.



# Fabrication and Finishing Techniques of Stainless Steel Equipments for Food Processing Industry

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## Abstract

*A wide variety of vessels and pipework is used for the hygienic manufacture of food products. Most of this equipment is fabricated from austenitic stainless steel (AISI 304/AISI 316 or its equivalents). Welding is the usual method of connecting the various component parts of a plant, and hence it is important to ensure that weldments reflect the hygienic qualities of the parent plate or pipework as closely as possible. This paper describes methods of construction and fabrication, illustrating as to how design criteria can be met in food process equipment and aims to increase the general level of awareness of the techniques required to fabricate the acceptable process equipment for food applications. Although primarily aimed at project and process engineers, it should be of interest to anyone involved in plant installation and maintenance. A few examples have been cited and discussed to highlight the subject.*

## Introduction

The need for processing, preserving and distribution of food and beverages is becoming increasingly important day by day to make their availability

easy at relatively low cost. There has been a phenomenal growth of food processing industries, particularly in developed countries. These industries have also started growing rapidly even in other countries including India.

Stainless steels find extensive use in food processing industry for the manufacture of

**Stainless steels find extensive use in food processing industry for the manufacture of various items, including equipment, components and appliances due to their versatility.**

various items, including equipment, components and appliances due to their versatility. A wide range of stainless steels are available with

different chemical composition and material characteristics to meet specific service requirements. These steels are well adopt themselves for fabrication by deep drawing, roll forming, pressing and welding etc., and work harden fast on cold working. Austenitic stainless steels are extensively used for food processing applications.

As the stainless steel exhibits maximum resistance to corrosion, this has a significant place in the food processing industry. IS 6913:1973 specifies the requirement for welded and seamless stainless steel tubes for food and beverage industry. In IS 4536 : 1968, the requirements for composite bottom stainless steel cooking utensils have been specified, as the stainless steel utensils have uniform thermal conductivity all over the surface area. The sizes of the utensils, which are in common use, have also been rationalised as per this standard (Table 1).

## Fabrication Techniques of Stainless Steel

In general, almost all types



of SS possess good corrosion resistance. However, austentic SS components.

**Table 1. Indian Standards on Stainless Steel Used in Food Processing Equipment**

IS 2336 : 1963	SS milk vats
IS 2492 : 1976	SS rod milk tankers
IS 2688 : 1974	Insulated SS milk storage tanks
IS 3382 : 1965	SS milk pipes and fittings
IS 4938 : 1969	Insulated SS milk storage tanks, vertical types (10,000 & 15,000 Lts. capacity)
IS 11585 : 1985 (Part I)	Insulated SS silos for milk storage (Part I : Capacity 60,000L & 100,000L)
IS 4743 : 1968	Settling tanks for ghee (SS)
IS 5804 : 1987	Poultry debeakers
IS 6696 : 1972	Egg washing machine (Tank)
IS 9852 : 1981	Milk collection trays
IS 6591 : 1972	Rail milk tankers
IS 5253 : 1969	Guidelines for cleaning & sterilizing dairy equipments
IS 6913 : 1973	SS tubes for food and beverage industry.

Source : ISSDA, (1990).

is preferred due to its fabrication properties. The principal fabrication operation involved in SS are cutting, forging, casting, welding, cold forming, heat treatment and finishing. It is important that food process equipments (e.g., pressure vessel) be maintained at design and manufacturing specifications. Specific attention must be paid to gasket and flange surfaces of tubing fittings or access openings, because these are vulnerable to wear or degradation. All mating surfaces should be protected by soft covers such as wood or plastic, when they are temporarily stored during maintenance, inspection, cleaning and repair.

The frequency of maintenance depends on the type of process and can vary from one to five years. Processes that are corrosive or erosive often require the higher frequencies. A design file should be opened and maintained for the vessel and its structural

The normal maintenance of vessels consists of cleaning, inspection and testing. Visual

**The main points to keep in mind are good housekeeping, strict cleanliness of the shop, care in adhering to fabrication standards, instructions and inspection at different stages of fabrication of the food process equipment.**

inspection of the vessel is a preferred first step. If the inspection shows localized

pitting or cracking, then more sophisticated metallurgical tests such as chemical dye, ultrasonic and X-ray analysis should be performed to determine the type and extent of repair required. A hydrostatic test should be performed to assure integrity of the vessel. Hydrastatic tests do not ensure against pinhole leaks, but do assure the vessel's capability to contain the process.

Hence, the main points to keep in mind are good housekeeping, strict cleanliness of the shop, care in adhering to fabrication standards, instructions and inspection at different stages of fabrication of the food process equipment. Cleaning, stress relieving and descaling are important post-fabrication treatments.

## Cutting of Stainless Steel

Cutting of SS plate, sheet or bars to the desired size is the first step of any fabrication process. SS can be cut by either cold cutting or hot cutting processes.

### 1. Cold Cutting

SS is mostly cut in cold condition by three methods : Shearing, Blanking or Sawing.

a) *Shearing* : SSs have higher shear strength than the carbon steels and therefore it requires more force and heavy machines to shear the equal thickness of SS products. Shears with a capacity 30 to 50% greater than that used for similar thickness of carbon steel are required to shear SSs.

High speed steel or D-2 steel blades are used. Proper blade clearance is very important for smooth shearing. Generally clearance of 3 to 5% of the stock thickness is maintained to get sharp cut edges. Lubricants though not essential, periodic application of soap or kerosene may be helpful in reduction of



metal pick up on the cutting edges. Various types of manual and power driven shearing machines are available for SS shearing.

b) *Blanking* : Blanking of SS requires 50 to 100% higher force than for equivalent work piece of carbon steel. To reduce the shearing force in blanking of SS parts, one of the cutting tools is often provided with angular shearing edges or stock is warmed up to a temperature upto 175°C.

A clearance of 5 to 10% of stock thickness is maintained between tool and die. Light lubricants can be used to prolong die life. Sulfochlorinated mineral fatty oil is an effective lubricant in blanking.

c) *Sawing* : SSs can be saw cut with saws, mechanized or hand operated hack saws. Abrasive saws are also used for straight cutting of SS plates. Power hack saw is generally used for cutting of heavy sections, mostly of repetitive jobs.

## 2. Hot Cutting

Two main methods employed for SS hot cutting are : a) flame cutting with flux or iron powder and b) plasma arc cutting.

a) *Flame cutting* : Powder or flux flame (oxy-acetylene flame) cutting can be used to cut SS plates and bars in thickness range of 6mm to 500mm. Iron powder or flux is injected directly into the torch tip by the oxygen. Machines are available for manual or mechanical operations with auxiliary devices, using templates and pentographs. Clean and narrow cuts can be made in vertical position free from dross.

b) *Plasma arc cutting* : For cutting SSs, plasma arc cutting technique has been in use for a number of years. Conventional plasma arc cutting employs expensive gases like Argon for

cutting and hence the process is totally uneconomical.

Particularly, for thin sheet cutting, mechanical methods are preferred. The gases used for SS cutting are generally mixtures of nitrogen and hydrogen. Clean, smooth and fine cuts can be made by plasma jet.

## Forming of Stainless Steel

Stainless steel sheets and plate can be formed into various

**Stainless steel sheets and plate can be formed into various shapes by cold forming operations performed at room temperature.**

shapes by cold forming operations performed at room temperature. There are various cold forming methods like press brake forming, cold roll forming, deep drawing, spinning etc.

*Press brake forming* : The press brake forming process is used for small volume of production, using general purpose or make shift dies. Almost all types of SS strips, sheets and plates can be formed by press brake. Press brake generally uses universal type of dies and punches, which can be used for production of variety of shapes and sizes. While forming SS, the adequate spring back allowance should be provided in the die to get correct final shape.

*Cold roll forming* : Stainless steel strips can be cold roll formed into various shapes including tubes, channel, angles etc., by passing through a series of contoured rolls, which

progressively develop the desired shape. Due to work hardening tendency, strength and finish of SS roll formed products can also be improved.

*Deep drawing* : In deep drawing, a flat sheet metal is formed into a cylindrical or box shaped component by means of a punch and die of draw ring. The forming operations are usually performed in double action press with a blank holder to prevent wrinkling in the flange during drawing.

*Spinning* : Conical, spherical and complex bowl / cup shaped parts which require several stages with intermediate annealing if deep drawn, can be formed in one or two steps by spinning.

Spinning is a forming process by which flat metal piece is formed into desired shape by the application of pressure, supplied by a spinning tool or a roller, as it is being rotated while attached to a revolving chuck. Deformation of the metal during spinning proceeds by combined effect of bending and stretching process.

## Welding of Stainless Steel

A wide variety of vessels and pipework is used for the manufacture of food products. Most of this equipment is fabricated from austenitic SS (AISI 304/304L/316/316L). Welding is the principal joining method in the fabrication of SS food process equipments.

In the past, SS has been welded most often with covered electrodes i.e., manual metal arc welding. The improvement in recent years has resulted in the increased use of TIG (Tungsten Inert Gas) and the highly productive MIG (Metal Inert Gas) welding process. Table 2 shows the weldability of different SSs in the fabrication of the process equipment.



**Table 2. Weldability of Stainless Steels**

Steel type	Problems	Solutions	Weldability
Austenitic	Distortion, Sensitization, Hot cracking treatment, stabilized grades	Good weld design, extra low carbon content, solution	Very good
Ferritic	Excessive grain growth, lack of ductility, sensitization	Low heat input, avoid slow cooling, anneal at 760°C, titanium addition.	good
Martensitic	Weld cracking	Pre-heating & post annealing to improve mechanical properties.	Fair to good

Source : International Nickel Co., New York.

**TIG Welding :** The TIG welding method is characterized by high welding quality, clean weld metal and good surface finish. It is, therefore, extensively used in the process industries as well as within the food industry. TIG welding is particularly suitable for lighter sheets/flats thin as 0.5mm thick. For thin sheet welding, (0.3mm to 4mm) square butt joints can be made without any filler materials. Filler metal if needed is fed into the arc and the molten pool from the side.

A surface roughness (Ra) of 3 to 4 microns can be achieved on high-quality TIG welds, though Ra values of 7 to 8 microns are more likely on "industrial standard" welds. The salient features of TIG welding are shown in Table 3.

### Shielding Gas for TIG Welding

Argon is the ideal shielding gas for TIG welding because it is easily ionized and intensive to variations in arc length.

For manual welding, pure argon is recommended. For mechanized TIG welding, pure helium gas is used. Argon may

also be mixed with helium or hydrogen. Gases containing hydrogen must only be used, if the SS is austenitic.

### Filler Materials for TIG Welding

A wide range of filler materials with compositions matching those of the base metal are available. Normally, the wires have slightly higher silicon content to compensate for burn-off and act as a deoxidizing agent. For manual applications, normally wires of diameter

1.6mm to 3.2mm are used with lengths of 700mm to 1000mm. For mechanized applications, wires wound on spools are employed.

### MIG Welding

The MIG (Metal Inert Gas) welding is productive, economic and easily applied. There is a need to protect the surfaces (non-welding) during welding. Otherwise, it leads to corrosion problems in the finished equipments. MIG welding of SS is usually performed in thin materials. For this application, a method which gives the benefits of the spray arc with a minimum of spatter would be desirable.

In MIG welding, wires of different diameters (Table 4) and composition are used, depending upon the required minimum welding current that must be exceeded to achieve spray transfer. Table 5 shows the different types of electrodes supplied by some of the Indian companies for MIG welding of SS. The commonly used shielding gases for MIG welding are shown in Table 6.

### Welding of Dissimilar Metals

Welding of dissimilar

**Table 3. Salient Features of TIG Welding and Weld Deposit**

- \* High quality weld metal
- \* Even and smooth finish
- \* No spatter
- \* No slag formation
- \* No welding times
- \* Easily adaptable for machanised/automated welding
- \* Easily programmable
- \* Weld deposit fully austenitic
- \* Heat resistant at working temperatures upto 1200°C
- \* Sulphur-free atmosphere
- \* Ultimate tensile strength 56-66 Kgf/mm
- \* Elongation 35%



**Table 4. Welding Current Range and Diameter of Electrodes Used for MIG Welding**

Electrode, (mm)	Length, mm	Current (amps.)	SS Sheet Thickness (SWG)
1.5	250	20 - 25	16
2.0	300	35 - 45	14
2.5	350	50 - 60	12
3.25	350	80 - 100	10
4.0	350	110 - 140	8
5.0	350	150 - 180	6

**Table 5. Electrodes for MIG Welding of SS**

Supplier	Standard Electrode
Advani Oerlikon	Superinox - 1A, 1B, 2B INOX - CW INOX - D <sub>2</sub> - Mo
D & H Secheron	RUTOX - A STAB Mo (STAB)
Indian Oxygen Ltd.	CROMOID - 1, 2, 3

**Table 6. Shielding Gas for MIG Welding**

Gas	State
Argon	Inert
Helium	Inert
Oxygen	Oxidizing
Carbon dioxide	Oxidizing
Hydrogen	Reducing

metals is of prime importance to the fabrication of food machinery. The major types of welding mechanisms that are currently approaching the possibility of dissimilar welding are explosive welding, ultrasonic welding and diffusion bond welding.

**Explosive welding :** The fastest growing branch of explosive metal working is the welding, joining and cladding of metals. Strong metallurgical bonds can now be produced between metal combinations,

which cannot be welded by other methods. For example, Tantalum can be explosively welded to steel, copper to stainless steel. In explosive welding, the plastic deformation is restricted to the interface or the area between the two faces of the metal. The explosive impulse is used to provide both extremely high normal high pressure and relatively slight shear or sliding pressure between the two surfaces, or the interface. Explosive welding and cladding are carried out by bringing together properly paired metal surfaces with high relative velocity at a high pressure and with a proper orientation to each other so that a large amount of plastic interaction occurs between the surfaces.

Some major applications for these clad products are heat exchanger tube sheets and pressure vessels. The explosive bonding process for stainless

steel clads is expected to be more competitive in thickness over 2 inches.

**Ultrasonic welding :** In the ultrasonic process, pressure is applied on the two sides of the work, while the hydraulic piston forces the welding pieces against a solenoid that vibrates them at about 20KHz/sec. An ultrasonic weld is completed in about as much time as it takes to strike an arc in arc welding.

Ultrasonic welding combines pressure and high frequency vibration motions to form a solid state bond. This cool, strong weld is capable of joining such combinations as aluminium to stainless steel, aluminium to tungsten, aluminium to molybdenum, and nickel to brass. It can even join a large metallic object to a piece of foil. Ultrasonic welding has also made it possible to join metals with vastly different melting temperatures, making strong rigid joints.

**Diffusion welding :** Diffusion bonding is a process that does not necessarily need heat to produce a fusion weld. Rather, it needs two kinds of surfaces that can come into intimate contact under pressure. This pressure is applied for a period of hours. Because of the intimate contact of two pieces of metal, the pressure applied ranges from 5000 to 10,000 Psi. In this process, if the temperature is raised, the diffusion rate will be cut sufficiently. The one basic requirement for this process is that the material is surfaced accurately so that an intimate bond can take place.

This process makes it possible to join metal to metal, metal to ceramics, and metal to metal with intermediate bonding materials.

Due to the high cost of SS used in food process industries, it is essential to use other materials like copper, brass,



aluminium, glass and ceramic lined vessels. The welding of dissimilar metals plays a very big role in the fabrication of food machinery. The copper bottom cookers and vessels, TEFLON coated non-sticky pans and vessels are the examples. Welding of these types of materials with SS poses a considerable problem. The bonding of two such metals totally decreases the cost of the equipment and improves the efficiency, and imparts the major properties, which are required for the food processing equipments.

## *Fabrication of Vessels and Pipework*

In order to achieve good cleanability of a vessel surface, it should be smooth; the surface roughness value is usually 0.8 micron Ra. This is achieved in practice by using cold rolled sheet (2B surface finish), typically of 0.3 micron Ra, which is available for vessels upto 4 mm wall thickness. The sheet should be protected with a vinyl layer. This can be left in place during forming and removed on completion of fabrication. A narrow band (50 mm) is usually removed from the proposed weld line to facilitate the joining and avoid contamination.

The weld area does not generally require any special preparation for thin sheet, but must be free from grease and dirt. Usually, two runs are applied from opposite sides. The first run will become oxidized on the reverse side and this must be ground back to sound metal before applying the second run. This must then be ground back flush with the parent plate and polished to restore the surface finish; a final polish at 150 right size is sufficient to give the required surface roughness.

The requirements for welds in SS pipework are summarized in Table 7. Orbital welding is recommended for the straightforward butt welding of

**The major types of welding mechanisms that are currently approaching the possibility of dissimilar welding are explosive welding, ultrasonic welding and diffusion bond welding.**

pipework. An orbital welding machine, once setup correctly, will repeatedly produce welds of the defined quality with no variation.

## *Pipe Cutting and Surface Preparation*

A mechanical mill or saw should be used to ensure that

**Due to the high cost of SS used in food process industries, it is essential to use other materials like copper, brass, aluminium, glass and ceramic lined vessels.**

the cut face is exactly at right angles to the longitudinal axis of the pipe. Any butts must be removed with either a file or

emery paper. Care must be taken to avoid removing the corner edges of the pipe, as this can cause problems with fusion of the root of the weld.

The pipe surface 25 mm either side of the weld should be roughened up with a SS wire brush or emery paper. Then, both the pipe ends and the roughened surface area should be degreased with solvent. Failure to do so leads to porosity in the weld, as organic substances, if any, remaining on the metal surface are vaporized during the welding process and form bubbles in the weld metal.

The normal maintenance of vessels consists of cleaning, inspection and testing. Visual inspection of the vessel is a preferred first step. If the inspection shows localized pitting or cracking, then more sophisticated metallurgical tests such as chemical dye, ultrasonic and X-ray analysis should be performed to determine the type and extent of repair required. A hydrostatic test should be performed to assure pressure integrity of the vessel. Hydrostatic tests do not ensure against pinhole leaks but do assure the vessel's capability to contain the process.

## *Post-Weld Treatments*

With suitable post-treatment, the service life of a SS component used in a corrosive environment can be increased. The oxide coating adjacent to the weld must be removed. This is done with a pickling paste. After pickling, it is essential to rinse away all residual pickling acid with water. The oxide coating can be removed by brushing, grinding or peening.

A degreasing treatment may be applied to remove grease and oily residues. In general, all surfaces should be cleaned by washing with an alkaline



Table 7 : Checklist for Welds in AISI 316L Austenitic SS Pipework

- \* The pipe work and fittings should have an internal surface roughness of 0.8 microns.
- \* TIG welding must be used as the welding process
- \* Orbital welding machines should be used wherever possible for reproducible high-quality welds.
- \* Welders of proven competence, for example coded for pressure vessel work should preferably be employed.
- \* The pipe system should be designed such that butt welds are the only construction requiring welding.
- \* The internal surface must be gas shielded during welding, ideally with an argon purge gas, although nitrogen is acceptable
- \* Pipe ends must be clean in the fusion zone, and should be cleaned with a SS brush & solvent to remove dirt & grease
- \* Pre-fabricated fittings (T's, elbows, etc.) are required, & these must be consistent with the standard of pipe work.
- \* Misalignment must be limited to 20% of the wall thickness
- \* Trial runs/test pieces are required to establish the optimum conditions for the actual pipe wall thickness used.

detergent solution, followed by rinsing with water of good microbiological quality, usually chlorinated water to 2 ppm available chlorine maximum. After draining, the access points should be covered and sealed. Where excellent cleanability of the external surface is demanded, weld beads should be ground smooth and polished.

### ***Stress Relief Treatments***

For optimum corrosion resistance, SS equipment should ideally be subjected to a full solution annealing treatment after welding by heating the components little above 900°C, followed by fast cooling.

In case of solution annealing treatment, weldments could be stress relieved by holding at the rate of 2 hours/25 mm (1 inch) thickness at little above 900°C to relieve the stresses induced during welding, severe cold forming or machining. Stress relieving is particularly essential, if the SS is to be exposed to solutions containing chlorides, fluorides, sulphides etc. Before heat treatment, the surface of the SS should be cleaned thoroughly and should be free from carbon containing

contaminants.

### ***Quality Assurance and Inspection for Welds***

The general approach is first to prepare a specification of the requirements, including the defect acceptance criteria and surface finish. Essentially, there should be no surface-breaking defects. These requirements may be in addition to more stringent requirements such as relevant pressure vessel codes. The method of inspection and repair procedures also need to be agreed at the outset.

Few techniques are suitable for the inspection of SS equipment. Great reliance is placed on visual inspection of weld seams in vessels, aided by dye-penetrant tests for highlighting surface defects. The surface finish of polished weld seams can be measured using surface roughness indicator.

For critical applications, a more rigorous approach, viz., X-ray or ultrasonic method of detection, is required. Each weld must be identified with unique reference and for convenience grouped into segments. This can be achieved

simply in pipe work systems by grouping together all welds using the same gas purge. A documented record indicating the identity of the welder, inspection details and outcome, together with weld variables may be required.

### ***Recent Developments in Welding of Stainless Steel***

Conventional TIG welding plants based on rectifiers or generators are not ideally suited for thin sheet applications, since such power sources are not programmable. Recent developments in electronics has helped in building totally programmable TIG equipments, based on thyristor or transistor controls. Thanks to such programmable control equipment, it is now possible to monitor a number of functions and parameters, which are critical to achieve first class welding results.

Automatic pre and post-flow of gas  
Start, welding and root shielding gas  
Welding speed  
Wire feed for filler material



Pulsing : current, wire feed, system movement, etc.

## Synergic Control

In order to save the welder, the trouble of setting all the parameters (current, wire feed speed, etc.) himself, synergic control machines are now available. Synergic control means using a key process parameters to calculate and control the remaining parameters in the process. In practice, this means that the welder chooses a preselected option on a rotary switch, keyboard, etc. to programme the wire types, wire diameter and shielding gas to be used.

The welder only needs to set the correct wire feed speed after taking account of the plate thickness to be welded. In this case, the wire feed speed is used as key parameter. The control equipment in the power source then calculates the other suitable pulse parameters automatically.

## Surface Finishing and Conditioning

Surface finish of SS is an important element in its selection and application. Stainless steels are finished to give desired appearance to enhance their aesthetic appeal, cleanability, improved corrosion resistance and in many cases, decrease tendency of formation of harmful deposits including bacteria and fungus. The main processes used for finishing are grinding, polishing and buffing.

Polishing operations are conducted with the help of either abrasive mounted on made up shaped wheels or belt that provide resilient backing. Depending upon the roughness of the base material, a starting grit size in the range of 80 to 100 may be selected to ensure that after polishing, the desired smoothness is obtained. Precautions should be taken to

avoid iron contamination, excessive pressure while polishing and heat build up on the SS surface. While polishing, uniform speed must be maintained.

**Buffing is performed on polished surface free scratches and defects, to get desired stainless luster and colour.**

Buffing is performed on polished surface free scratches and defects, to get desired stainless luster and colour. Buffing operation is performed in two stages : the cutting down buffing and colour buffing. Both buffing operations can be performed by portable or fixing

machines depending upon the shape and volume of the work piece.

In the food/dairy/beverage industry, mostly cold rolled, annealed and pickled SS sheets and coils are used. They have a smooth, polished surface which decreases the incidence of corrosion and in many cases, decrease tendency of formation of harmful deposits including bacteria and fungus and facilitate easy cleaning. Surface finish of SSs used for food processing application is generally set at 1 micron. Polishing the roughness to 1 micron level does not lead to any improvement in cleaning efficiency. Hence, electropolishing may not be necessary. In case of tubes and fittings, surface finish is set at 0.5 to 1.0 micron. Table 8 lists the relation between different treatments of SS and the surface roughness that can be obtained by each treatment. This Table is intended as a guide only ; whether the intended surface roughness has been obtained

**Table 8. Example of Surface Treatment of SS and The Resulting Surface Roughness**

Treatment	Ra (Micron)
Cold rolling	0.2 - 0.5
Hot rolling	> 4.0
Glass Bead Blasting	1.0 - 1.2. (Depends on bead size)
Descaling	0.6 - 1.3
Bright-annealing	0.4 - 1.2
Pickling	0.5 - 1.0
Electropolishing	Depends on original finish
Mechanical polishing with aluminium oxide or silicon carbide of abrasive grit Number :	
500	0.1 - 0.25
320	0.15 - 0.4
240	0.2 - 0.5
180	< 0.6
120	< 1.1
60	< 3.5

Source : Surface Roughness - Terminology Part - 2 (1982).



should be measured.

Equally important to surface finish is cleanliness. A good finish can be ruined, if dirt contaminates the surface during handling and assembly. As mentioned earlier, a clean room is needed for fabrication of original equipment, such as seals and valves. Proper surface hardness must be reproduced on repair parts. For instance, reciprocating compressors usually require tough steel for compressor rods to withstand the cycling of stresses with a surface hardening, such as nitriding, in the packing area to reduce wear and maximize running time.

## Insulation

The two options available for the insulation of SS equipment and pipework are : a) vacuum insulation and b) sealed cladding.

In vacuum insulation, the pipework is insulated by the evacuation of air in the shell of a double-walled pipe. This is a very effective way of preventing any of the problems listed. Process vessels can also be insulated with any non-chloride-releasing insulating material, and covered with SS cladding. The cladding must be fully welded, so that no ingress of air or moisture is possible.

## Heat-Resistant Material in Food Industry

The heat, abrasion, and corrosion resistance of FGMs (Combination of metal and a ceramic) would benefit the food processing industries, allowing the new process to be developed, and improving the reliability of food process equipment.

The idea of FGMs was originated in Japan in 1984, to fulfil the need for a strong new material that could, on one side, withstand high temperature,

corrosion and abrasion in an oxidative atmosphere. FGMs can be synthesized either as coatings, or as sintered and pressed powders. Chemical vapour deposition (CVD) is one such coating technique widely used in food industry. Low pressure plasma spraying promises to allow large and relatively complex surfaces to be coated with FGMs. Hot isostatic pressing (HIP) is often used to sinter powders, encapsulated in glass. For a zirconium-SS FGM, conditions would be 1200 - 1300°C and 100 - 150 MPa.

FGM's ceramic side can endure not only heat, but corrosion - a fact that could make possible new food processes operating under conditions that no material can now handle.

## Cost Factors

In most of the cases, there will be more than one alternative material, which may be considered for specific application. In the selection of an appropriate grade of SS, after the corrosion resistance, mechanical properties and fabrication requirements are fulfilled, while the cost becomes the next important consideration.

The final decision of selection of the material should be made on the basis of 'Life Cycle Cost' analysis. Before going for the major capital investment, all relevant cost factors for the entire life cycle of the asset must be identified and optimized. Some of the major cost factors are :

Total cost of the equipment; Total installation cost; Service life; Maintenance cost; Cost of downtime for repairs or replacement; Time value of money; Depreciation, Taxation, etc.; Inflation rate, etc.

Proper analysis can give comparative cost of various alternative SSs to facilitate right selection.

The average cost break up to the capital equipments in the Chart and the material cost only represents 5%, whereas life cycle cost affected by material selection amounts to 42% of the total cost.

Life cycle cost analysis could point out the optimal economic grade of SS, which may contribute to considerable reduction in the cost of equipment over its life time, resulting in maximum return on investment by improved equipment availability and overall productivity.

## Conclusions

Handling fabrication of SS used in food processing and beverage industry calls for modern welding and cutting equipment with electronic control and matching filler materials. Added to these, welding practice itself plays a key role in achieving reliable welds. With the availability of advanced equipment and controls locally, fabrication of SS should become far more simple and straightforward.

Due to the high cost of SS used in food process industries, it is essential to use other materials like copper, brass, aluminium, glass and ceramic lined vessels. The welding of dissimilar metals plays a very big role in the fabrication of food machinery. The copper bottom cookers and vessels, TEFLON coated non-sticky pans and vessels are the examples. Welding of these types of materials with SS poses a considerable problem. The bonding of two such metals totally decrease the cost of the equipment and improve such metals totally decrease the cost of the equipment and improve the efficiency, and imparts the major properties which are required for the food processing equipments.



Among the non-metallic material of construction, PVC and high density polyethylene have been adopted in food processing plants for containers and storage tanks. Though corrosion resistance of these are good, fabrication problems are too many due to their physical properties.

Epoxy coating of mild steel tanks have been adopted in a number of cases to improve the corrosion resistance of mild steel. Like the other polyethylene, heat transfer problems are severe in these units. In addition, peeling of the coating often and consequent recoating adds to the maintenance cost.

In most cases, the fabrication of SS for food plants has to be based on pilot plant studies of each processing units due to the wide variations in the behaviour of food materials. Initial trial runs and performance tests correct most of the deficiencies in the preliminary design and material of construction. When the indigenous technology has found good response in export market, plant fabrication facilities must be geared up to sustain the load. With the knowhow and techniques developed in the country, with its available skill, a coordinated effort will go a long way in establishing Indian food plants in most of the developing countries.

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# Hydrocolloids in Dairy Industry

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## Abstract

Hydrocolloids play an important role in dairy industry. In this paper, their application in cheese manufacture is emphasized. Most of the food processors, looking for a suitable thickener, stabilizer, or gelling agent, need to consider the basic functional requirements in the possible interactions with other components and stability to processing conditions. Protein complexing ability of charged polysaccharides, particularly carrageenan, pectin, etc., are used effectively in cheese industry, because of their ability to form gel matrix. Thus, increase in cheese yield, stability to fat emulsion and dressing aid in cottage cheese, soft body to low fat cheeses, etc. can be achieved effectively by addition of hydrocolloids in cheese milk in correct proportions.

## Introduction

Hydrocolloids, also known as gums, are important because of their hydrophilic properties which make them important textural components in food systems. The gums are water soluble or water dispersible. Water control in the food system is achieved by thickening and/or gelling mechanism. However, the protein stabilizing ability of certain hydrocolloids has added to the growing awareness that these polysaccharides also function by integrating with the components of milk. The

present paper covers some of the aspects of hydrocolloids in cheese manufacture.

## Hydrocolloids

The hydrocolloids or gums are classified as polysaccharides and grouped according to their origin (Meer *et al.* 1975 ; Iggo 1982 ; Southgate 1984). Sanderson (1982), has outlined the polysaccharides used in processed foods (Table 1). Kelco Division of Merck and Co. Inc. (USA) have developed a biogum

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(Gellan gum), produced by controlled fermentation of *Pseudomonas elodae* with deacetylation to give a gum, similar to K- carrageenan (Hannigan 1983).

## Characteristics of Hydrocolloids

The characteristics of each

gum are based on its viscosity producing capability, when dispersed in water. Because of this capability, gums have a variety of functions in foods (Glicksman 1974). Numerous applications of gums in the food and dairy industry are illustrated by Morley, (1982) (Table 2).

The solution properties of one gum can often be modified by interactions with other gums (Sanderson 1982). These interactions result in modification of flow properties, protein reactivity, solubility, viscosity, synergism and gel formation of the gums (Iggo 1982). The choice of the stabilizer and the gelling agent, thus, will depend upon the particular application, one is looking for.

## Interactions

The addition of hydrocolloids to milk systems at pH 6.7 profoundly alters the state of aggregation of proteins as they possess amphoteric characteristics. Reconstituted whole milk is jellified by addition (0.5% w/w) of mixture of xanthan and glucomannan (Grandi and Carvalho 1988). At higher pH value, the protein-polysaccharide interaction can take place in milk due to the formation of an electrostatic complex. This is due to adsorption of Kappa or iota carrageenan on casein micelle surface (Snoeren, *et al.* 1975 ;



**Table 1 : Polysaccharides Used in Processed Foods**

Type/Origin	Example(s)
Starch and derivatives	Raw starches, pregelatinized starches, modified starches
Cellulose derivatives	Microcrystalline cellulose, CMS, methylcellulose
Seaweed extracts	Alginates, carrageenans, agar
Plant exudates	Gum arabic, gum karaya
Plant extracts	Pectins
Seed gums	Locust bean gum, guar gum
Microbial gum	Xanthan gum

Source : Sanderson (1982)

Dalgleish and Morris 1988). The specificity of this interaction and the lack of reactivity of the other caseins towards carrageenan is due to differences in the primary structure of the proteins. In K-casein, the cationic and anionic amino acid residues are sufficiently far apart to allow the molecule to orient itself with its cationic sites directed to the sulphate groups of the carrageenan. In K-casein, positive charged region exists between the residues 20 and 115, which is lacking in  $\alpha_1$ - and  $\beta$  casein. This positive region is responsible for the electrostatic interaction with carrageenan. A non-random distribution of anionic and cationic groups on the polypeptide chain is a prerequisite for such a localized interaction (Snoeren *et al.* 1975). The existence of  $\beta$ -casein in the system promotes the gelation of K-carrageenan in the presence of  $\text{Ca}^{2+}$  (Ozawa *et al.* 1985). That means, the net work formation is due to the calcium ions present in the milk system and hence the role of calcium ions cannot be ignored (Chakraborty and Hansen 1971). Role of hydrocolloids in different food systems has been described by Rao and Balachandran (1992). Hydrocolloids and/or their blends used in different milk systems are illustrated in Table 3.

## Applications of Hydrocolloids in Cheese Industry

Due to unique protein reactivity of the hydrocolloids, one could consider them as a processing aid to enhance cheese yield (Manning, *et al.* 1986). Locust bean gum is considered as Generally Recognized as Safe (GRAS) under the Federal Food, since 1974, when used as stabilizer and/or thickener in

**The addition of hydrocolloids to milk systems at pH 6.7 profoundly alters the state of aggregation of proteins as they possess amphoteric characteristics.**

cheese (Anon 1974). Peters *et al.* (1976) have patented a cheese product comprising 90% natural cheese dispersed in an aqueous gel matrix of xanthan gum and locust bean gum. This product can be stored under ambient conditions for use as cheese flavourings.

Processed, non-fermented cheese-like product can be prepared by direct acidification of milk, which is added with 1% carrageenan. This product has mechanical properties similar to those of commercial cheese (Rosenall *et al.* 1978).

Addition of a solution of either carrageenan, guar gum, gelatin, carob gum, xanthan or mixture of any of these in cheese milk prior to coagulation or UF retentate will improve the homogeneity and organoleptic properties of cheese (Piliero and Meugniot 1991).

## Processed Cheese

Consciousness in fat consumption has stimulated research into replacement/reduction of fat in foods. Natural and processed cheeses are high fat foods. Therefore, fat replacement is of utmost interest. Hydrocolloids have been recommended for use as stabilizers in pasteurized processed cheese since 1930 (Brummel and Lee 1990).

Zeigalmayer (1935), recommended pectin to improve hardness and water holding capacity to improve flavour and increase digestibility of processed cheeses. Low levels of hydrocolloids were used since then to stabilize high and low fat processed cheeses (especially low fat with high moisture process cheeses). Table 4 gives an idea about composition and textural evaluation of cheese spreads.

A thin coating of hydrated starch or mixture of hydrated starch and gum is applied to processed cheese slices to avoid sticking together during stacking (Warwick 1975).

Pasteurized processed cheese spread containing varying combinations of xanthan gum, locust bean gum and guar gum contribute to eating and textural characteristics, while individual hydrophilic colloids can not.



**Table 2. Application of Gums in the Food/Dairy Industry**

Increase viscosity	Thickening suspended solids, emulsion stabilization.
Induce gelation	Produce gels, suspend solids.
Bind water	Affect solubility, speed drying, speed setting, prevent separation.
Affect crystallization	Improve texture, improve lustre, induce smoothness, prevent sticking.
Affect surface tension	Improve whipping, improve emulsification, stabilize foams.
Form films	Flavour fixation, encapsulation.
Protein reactivity	Suspend solids, improve texture, stabilize foams, prevent serum separation.
Miscellaneous	Prevent flavour masking, improve gloss clarification, cloud agent, adhesive binding agent, swelling agent, flocculating agent.

Source : Morley (1984)

Improved mouth feel and flavour release are obtained, while maintaining textural properties (Kovacs and Igoe 1976).

Several processes are patented for the production of low fat cheeses by addition of hydrocolloids in milk prior to coagulation (Gammy 1992) or

quality was made by El-Neshawy *et al.* (1986). They found that addition of cmc (0.1%) or carrageenan (0.02%) in cheese milk, improved the body characteristics of low fat cheeses (1.0, 1.5, or 2.0%), but did not affect flavour development compared to control cheese (4% fat with no stabilizers).

Fat reduction (upto 40 to 50%) in the processed cheese can be achieved by addition of different hydrocolloids. Results are presented in Table 4 (Brummel and Lee 1990).

## Cottage Cheese

It is an acid coagulated cheese, containing only about 60 mg of Ca/100 g compared to over 700 mg of Ca/100 g in rennin coagulated cheddar cheese (Puspitasari *et al.* 1991). Low calcium content of cottage cheese is due to the acid pH value (4.6 pH) used for coagulation of skim milk. This low pH dissolved the colloidal calcium-phosphate effectively from micelles and thus facilitates its transfer into the whey and wash water (Craddock and Morr

1988). Therefore, addition of calcium in cottage cheese is essential. However, fortification of cottage cheese with calcium leads to bitter flavour. This bitter flavour can be masked by addition of several hydrocolloids such as ; low viscosity guar gum (25%), solution of gum arabic (20%), carrageenan (1.5%) and xanthan (0.2%) in the cottage cheese (Puspitasari, *et al.* 1991).

The water binding capacity and gel strength of cottage cheese can be improved by the incorporation of 0.5 to 10% (by wt.) of - cellulose powder (Wingerd and Bergsbaken 1979).

Addition of iota-carrageenan (250-1000 ppm) in cheese milk for cottage cheese manufacture is said to be optimal. This results in increased whey protein recovery, production of cheese of desirable texture and of high nutritional value. It also ensures recovery of nutrients which are said to be normally lost in the whey in direct-set cheese-making method (Witt 1986).

The yield-enhancement (about 25%) function of carrageenan in cheese may be due to number of reasons (Manning *et al.* 1986) as listed

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combining with other milk ingredients simultaneously (Rizzotti and Villaudy 1989 ; Visser *et al.* 1991).

An attempt to produce low fat Ras cheese of acceptable

below :

(i) presence of carrageenan maximizes precipitation during cheese making thus reducing fines lost in the whey, (ii) whey proteins are co-precipitated along with the primary carrageenan-



## Hydrocolloids in Dairy Industry

**Table 3. Hydrocolloids in Different Milk Systems**

Milk System	Hydrocolloids/blends	Results	Reference
Skim milk	Carrageenan	Stabilizes dilute skim milk against coagulation by chymosin in presence of $Ca^{++}$	Hansen <i>et al</i> , (1980)
Recombined milk	Blends of xanthan gum and galactomannans	Increased viscosity, formation of thermally reversible gels	Kisselburgh, (1982)
Flavoured milk			
(a) Chocolate milk	CMC	Prevents curdling	Morley, (1984)
(b) -do-	K-carrageenan (High mol. wt.)	Prevent sedimentation	Morley, (1984)
(c)-do-	Starch	Additional mouth feel	Morley, (1984)
(d) Soy milk	K-carrageenan	Improves gelling properties	Snoeren, <i>et al</i> , (1975)
(e) Dry chocolate drinks	Methyl cellulose, Hydroxy propyl methyl cellulose	Stimulates consistency suspension of cocoa particles	
(f) Fruit flavoured milk	CMC	Prevents protein precipitation	Asano, (1966)
Cultured milk beverage	CMC, pectin PGA	Improves viscosity	Towler, (1984)
Condensed/ Evaporated milks	CMC	Prevention of large undesirable crystals	
(a)-do-	Carrageenan	Stabilizes creaming	Prasad and Balachandran, (1987)
Sterilized milk	Carrageenan	Retards globule stability, affects protein stability	Cheng <i>et al</i> , (1974)
Ice cream	Carrageenan, CMC, xanthan gum, Guar gum, Locust bean gum	Prevents mix separation, wheying off	Keeney, (1972)
Baby formula	K-carrageenan	Prevents sedimentation, whey separation and fat separation	Morley, (1984)
Paneer	Carrageenan, Pregelatinized potato starch, Sodium alginate	Improves water binding capacity and consistency	Sachdeva and Singh (1988)
Cheese	Hydrocolloids and/or their blends mentioned above	Increases cheese yield, fat emulsion stability. calcium retention in cottage cheese, cottage cheese dressings.	Manning, <i>et al</i> , (1986), Kovacs and Titlow, (1976), Parker and Hicks, (1991).

Source : Compiled information



casein precipitate, and (iii) entrapment of fat particles may be enhanced by these interactions and thus contribute to increased yields.

Stabilization of cottage cheese creaming emulsion can be achieved by several

**Several processes are patented for the production of low fat cheeses by addition of hydrocolloids in milk prior to coagulation.**

hydrocolloids or their blends. A blend of xanthan gum with galactomannans (guar gum and locust bean gum) at 0.05 - 0.15% gave superior results, when used

as creaming emulsion stabilizer for cottage cheese dressings (Kovacs and Titlow 1976). Adsorption of dressing to curd increases with gum (xanthan) concentrations (0.1 - 0.3%) and temperature of dressing (Hicks and Bobo 1990).

Parker and Hicks (1991) have studied the effect of gum blends in cottage cheese dressings on absorption and syneresis. They found that dressings containing guar and xanthan gums had the highest initial viscosities and those with high-K-carrageenan had the lowest. Wheying off (syneresis) was also found to increase with increase in xanthan gum concentration.

### *Other Types of Cheeses*

The flavour of cheddar cheese made from various kinds of fats homogenized into skim milk was compared with cheese made from natural milk

emulsion. It was found that addition of gum acacia as an emulsifying agent made the flavour more cheddar-like (Fodo *et al.* 1974).

Rheological properties of the cheese and tvaroh can be improved by addition of 1%

**Stabilization of cottage cheese creaming emulsion can be achieved by several hydrocolloids or their blends.**

oxidized wheat starch in pre-gelatinized form to cheese milk (Hylmer and Teply 1974).

Loss in the weight of Domiati cheese during pickling can be overcome by treating

**Table 4 : Composition and Texture Evaluation of Cheese Spreads**

Hydrocolloid Type	Conc. (%)	Fat (%)	Moisture (%)	Melt (mm)	Texture evaluations
Guar	1.7	14.3-14.4	61.311 - 61.315	102 - 112	Slightly weak body, spreads well, good mouth feel, slightly foamy
K-Carrageenan	2.2	14.8 - 15.0	61.012 - 61.091	102 - 121	--
a. 60-DE Pectin	1.7	15.0 - 16.0	60.214 - 60.451	118 - 119	Slightly sticky, spreads well
b. -do-	2.2	14.5 - 14.7	61.560 - 61.651	98 - 99	Slightly pasty and sticky
a. 65 DE Pectin	1.7	16.0 - 16.7	58.150 - 58.193	81 - 83	Slightly dry, smooth, spreads well
b. -do-	2.2	14.3 - 14.5	61.985 - 62.345	100 - 108	Slightly weak body and foamy
a. 73 DE Pectin	1.7	14.5 - 14.6	61.134 - 61.160	100 - 101	Slight weak and sticky
b. -do-	2.2	14.5	61.610 - 61.798	72 - 101	Slightly sticky and spreads well
Control	0.0	25.6± 0.6	47.326± 1.48	129 ± 43.6	Texture similar to commercial spread

Source : Brummel and Lee, (1990).



cheese milk with gelatin (0.05%), agar (0.025%) or pectin (0.025%) prior to manufacture. The increased cheese yield is observed due to increased moisture content (Ghaleb 1977).

High fibre Mozzarella cheese can be manufactured by addition of 1.6% (w/v milk) soluble fibre in the form of gum arabic to cheese milk (Lee and Brummel 1990). Microcrystalline cellulose is also blended with a concentrated skim milk to form a slurry for the production of skim milk cream cheese (Smith *et al.* 1992).

## Conclusion

Interaction mechanisms of the hydrocolloids with the milk components and altering the functional properties of the complex formed is well known. Because of this mechanism, its application in food and dairy industry is of utmost important. Retention of calcium and stabilization of fat emulsion in cottage cheese can successfully be performed by the use of hydrocolloids. It also serves as the best dressing material in the cottage cheese. Low fat cheeses are now boosting up into the market because of fat consciousness of consumers. The adverse effect of low fat in cheeses (hard body, flat flavour, etc.) can also be masked to some extent by the use of hydrocolloids. Polysaccharide - protein interaction also helps in increasing cheese yield due to entrapment of other valuable milk ingredients in the complex formed. Doors are open for the researchers to go for new formulations/processings of cheeses with the use of hydrocolloids.

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Comet Fruit and Chemicals  
Rakhial, Ahmedabad - 380 023  
Gujarat.

## Low Temperature Drying Systems

Bry-Air India offers low-temperature drying system for drying temperature-sensitive products. The systems, working below 35°C, continuously remove moisture from the air around product by physical adsorption using a desiccant. Custom-designed for specific requirements, they come in different models with varying drying capacities. The dehumidifiers find applications in various industries where low-temperature drying is required-drying of cocoa, gelatine, yeast, coffee powder, flour, starches and onions, processing powdery foods like soft drink concentrates, milk powder and sugar, packaging and storage of biscuits, wafers and snacks, and in breweries and distilleries to prevent mould and mildew formation in hop storages, yeast rooms, and fermentation and kegging areas.

For details write to :

Arctic India Sales  
20 Rajpur Road, Delhi - 110 054

## Digital Humidity Meter/Printer

A portable battery-powered digital humidity meter and printer measures humidity as well as temperature. The KM 8004, features an instantaneous response from the capacitive sensing element for RH readings. It instantly displays humidity levels over the range 0-97% RH, thus eliminating the need for charts, tables, or experienced interpretation of results from previous non-electronic methods of measuring humidity. The meter is available in 3 models giving the user choice of a portable instrument which measures RH range 0-97% and measures temperature from 0-70°C by operating a simple slide switch. It can be used as a regular thermometer from -30°C to +450°C and a range of thermocouples is available. The KM 1203 is a humidity/temperature printer. Humidity measuring instruments are suitable for use in clean rooms, computer stationery units, fresh or dried food storage, in large libraries environmental chambers, etc.

For detail write to :

Manish Engineering Co.  
107, Surat Sadan, 88/89 Surat Street  
Mumbai - 400 009.

## UPS System

Suvik Electronics offers a UPS system, the Dataguard, for protecting data stored in personal computers and other PC-based equipment. The built-in voltage regulator makes for safe operation on mains. The built-in sealed maintenance-free batteries, with automatic

float-charger, enables instant back-up in case of power failure. The 20 to 30 minutes of back-up duration helps complete the ongoing job and saves the data by an orderly sheet-down. Built-in protection against over-voltage, overload, spikes and transients, EMI/RFI and battery discharge, and efficiency better than 90% are the other features. Available in 500 VA and 1 kVA models, the UPS systems finds applications in personal computer telecom equipment, PC-based control equipment like NC/CNC machines, and process instruments.

For details write to :

Suvik Electronics Pvt Ltd  
102 GIDC Engg Estate,  
Gandhinagar - 382 028 Gujarat.

## Hand Held Infrared Probes

Wahl Instruments Inc has introduced the TC950K non-contact infrared probe for fast, accurate measurement of surfaces, and most moving objects in maintenance, quality control, laboratory, and manufacturing applications. The Type-K probe is easy to use : simply plug it into a thermocouple thermometer, aim it at the target, and push a button. Temperatures are read on the meter's display. The probe measures surfaces as small as 0.1 inch from 0 to 500°F (-18 to 260°C) in one second. Reading in °F or °C are selectable. Accuracy is 2% of reading, or +/- 0.3°F (+/- 2°C), whichever is greater. The lightweight probe weighs less than 7 ounces and operates on a common 9-volt battery.

For details write to :

Jost's Engineering Company  
Limited



60 Sir Phirozeshah Mehta Road,  
Mumbai - 400 001

## Handy Vibration Meter

The Vibration Meter Type VM-301 is a lightweight hand held, battery operated instrument for vibration measurements and the unit has charge amplifier input stage which permits use of long accelerometer cables. Integrator stages following the amplifier facilitate measurement of velocity and displacement. In combination with the accelerometer type PG 101, the unit provides direct readout of vibration parameters on a 3-1/2 digit LCD display. An internal 9 V battery powers the unit. To conserve battery life, an auto shut off circuit having a period of 60 seconds is provided. It can be taken to any machine for making measurements.

Measurement ranges are :  
Acceleration 0.1-199.9m/s<sup>2</sup>; peak velocity 0.01-19.99 cm/s rms; displacement 0.0001-1.999 mm PP; frequency from 10 Hz to 15 kHz.

For details write to :  
Hillbrook Sales Pvt Ltd  
SP-75 Ambattur Industrial Estate,  
Madras - 600 058

## On-Line Micron Filtration System

Sarovar has introduced an on-line filtration system for superfine filtration of liquids in process industries such as chemical, electroplating, petroleum, fertilizers, food and beverages, oil and

pharmaceuticals. The micron filtration system totally filters suspended solids from a solution. High-tech filter cartridges of 40, 20, 10, 5, 2 and 1 microns are available for filtering fine, superfine and ultrafine dirt particles. The cartridges also come in different materials - polypropylene, ceramic, high-tech thermoplastic, plated paper, activated carbon, fullers' earth, etc. A variety of liquids can be filtered - water, oils, acids, alkalis metal solutions, organic liquids, lubrication oils, light diesel oil, petrol, petroleum products, etc. The filters can work in high temperatures and pressure, and in most stringent conditions. Filter housings are in MS, SS, polypropylene, rigid PVC, MS-FRP-lined, etc. for different applications. The self leaning system can be cleaned automatically by backwash operation. Flow rates range from 600 to 20,000 litres/hr.

For details write to :  
Savovar Industries  
E/6, Motinagar, Roshan Nagar  
Road, Borivil (East)  
Mumbai - 400 092.

## Digital Humidity and Temperature Indicator-cum- Controller

Elinco, in co-operation with EBRO Electronic G Germany, has introduced a 3-1/2 digit, dual-display, size, 220 V AC digital humidity and temperature indicator cum-controller, RHX-400, with the interchangeable, response probe EB-410. The measurement range is 0-1 rH (one-condensing) over a temperature range of -30 +140°C. It measures dry bulb

temperature as well, and also a set point controller with hysteresis adjustment. Standard outputs of 0-10 V and 0-20 mA can be used for transmission, strip chart recorder, etc. The instrument be used for humidity and temperature measurement control in computer rooms, warehouses, green houses laboratories, textile mills, tea and tobacco industries, etc.

For details write to :  
Electronic India Co.  
16 Indl Estate, Jagadhri Road  
Ambala Cantt - 133 001

## Portable Temperature Indicator

The handheld, battery-operated portable temperature indicator TMP-388 for industrial purposes has ranges from -50°C to 1,200°C with 1°C of resolution over the entire range. With use of latest CMOS technology, it gives an accuracy of 0.75% over full scale deflection. It accepts inputs like J, K, R, S, T, or PT-100. The TMP-388 works on 9 V battery, and has 3-1/2-digit LCD. It is compact in size 80 W x 140 L x 30 D mm.

For details write to :  
Ashish Trading Corporation  
B-120, Zalawad Nagar, Juhu  
Lane, CD Barfiwala Marg  
Andheri (West),  
Mumbai - 400 058.

## Vortex Gas Flowmeter

Rockwin offers a rang of ultrasonic vortex flowmeters in technical co-operation with J-Tec, USA. This range is ideally



suited for industrial metering of biogas, steam combustion air besides flare stake monitoring. The instrument works on the principle of vortex shedding. When a gas flows past an obstruction, vortices are created in a fixed predictable pattern. The number of vortices shed down stream per unit time is proportional to the flow rate. The measurement of vortex shedding is through an ultrasonic sensing. It offers a rangeability of 1:40 with almost negligible pressure drop. The wafer series is available from 10 to 100 mm with flow capacities up to 18,000 m<sup>3</sup>/hr. The insertion series is available for pipe sizes varying from 150 mm and above, with a velocity range from 1.4 to 56 m/sec. The meter is compatible with a wide range of Rockwin electronic read out units comprising totalisers, batchers, flow rate monitors, flow alarms, various outputs and dedicated flow computers.

For details write to :

Rockwin Flowmeter India Pvt Ltd  
P O Box 13, Vasant Vihar,  
New Delhi 110 057.

## Air Pollution Control Systems

Seamak offers a wide range of air pollution control systems and equipment including dust collectors, bag filters, smoke-exhaust and ventilation systems. The company specializes in paint booths and chemical fume scrubbing and humidification plants for textile mills nursery, mushroom farming, etc. Low cost ready-to-install units are available along with custom-designed plants for large installation.

For details write to :

Seamak Group

2489, 17th Main, Hal II Stage  
Bangalore - 560 008 Karnataka.

## Biscuit Packaging Machine

Shree Ancillary Industries manufactures biscuit packaging machines. The Model SAI/H/60 is appropriately designed for rectangular, square or round biscuits in standing on edge condition. Biscuits are manually served into the L-type conveyor. The biscuits are handed over inadvertently by specially designed pusher mechanism into the main feeding conveyor. From the main feeding conveyor, the biscuits are transported by the nylon lugs through the adaptable folding box along with the wrapping material for centre seal by the mutual arrangement of hot sealing rollers. The end sealing and cutting is done by the rotating hot crimpers. Also offered is the Model SAI/HSC/60, which is appropriate for pre-packed cream biscuits and plain biscuits with facility of changeover for various many-sidedness. All the constituents used in the machine are outlined and made to conform to international standards. Convenient accessible nylon lugs are intervened on main feeding chain to provide the facility of changeover to various forms with minimum setting time. Optional automatic chute feeding attachment is also in use for naked round, square and rectangular biscuits in piles of 2, 4 and 5 biscuits in either single or double pile. The biscuits are served directly from the stacker into the chute fastened to the main feeding conveyor for automatic counting of biscuits on pile.

For details write to :

Shree Ancillary Industries  
B-17 Girikumj Industrial Estate,  
Off Mahakali Caves Road  
Andheri (East),  
Mumbai - 400 093.

## Dust Collection/Filter Bags

Dust collection/filter bags suitable for high/low ratio dust collectors, are fabricated from woven/non-woven fabrics, viz., polyester, polypropylene, acrylic, polyacrylonitrile, antistatic (blended with stainless steel/copper) fibres for dust removal in industrial atmosphere from air, gas, oil, etc. The bags are custom-built. Fabric fibre construction is selected to suit the nature and characteristics of the dusts to be handled to give greater dust retention capacity. Non-woven filter bags offer very good permeability with low pore sizes, as it is needle punched and leads to efficient micro dust collection with low emission level. The bags can be treated for water repellance, fire resistance or special surface anti-adhesive, glazed finish. These filter bags are used by different sections of cement plant viz., raw mill, coal mill, kiln, clinker cooler, packing plant, silos, lime stone crushing besides industries like fertilizer, thermal power, metallurgical and flour mills.

For details write to :

Fine Filteraids  
4/43, Bazaar Gali, Vishwas  
Nagar, Shadhara, Delhi - 110 032.



## Hepa/Super Hepa/Ulpa Filters and Filtration Systems

Kirloskar Snydergeneral manufactures a range of highly sophisticated high efficiency particulate air (HEPA), super high efficiency particulate air (Super HEPA) and ultra low particulate air (ULPA) filters/filtration systems in technical collaboration with American Air Filters Inc/SnyderGeneral Corporation, USA. The HEPA/ULPA filters give an outlet air efficiency of 99.99% down to 0.3 micron particles ; efficiency of 99.9995% down to 0.12 micron is also achievable. These filters find applications which include electronics, nuclear and pharmaceutical industries, hospitals, operation theatres, computer installations, etc. Also undertaken are turnkey assignments in the area of filtration, ventilation, pneumatic conveying and air and water pollution.

For details write to :

Kirloskar Syndergeneral Ltd  
No. 11, 'Niton' Compound,  
Palace Road, Bangalore - 560 052  
Karnataka.

## Illuminated Magnifying Glass

Metal Spot Engineers offers a portable hand-held illuminated magnifier with built-in-light arrangement. The 75 mm diameter precision lens offers distortionless, strain-free viewing. The bulb offers

glare-free lighting. The magnifier consisting of built-in small lens, having diameter 20 mm offers higher magnification facilities for closer inspection. The lens and lamp combine to form an excellent inspection station, ideal for carrying out close visual inspection of small components, circuits, etc. The hand illuminated magnifier having light weight finds application in vast and innumerable areas like inspection and quality assurance departments, engineering industries, electronics and inspection of PCD, instrumentation, pharmaceutical, chemical, plastic, laboratories, drug and food analysis.

For details write to :

Metal Spot Engineers

Near Parvati Baug, Navsari (RS)  
- 396 450 Gujarat.

## Universal Multipoint Scanner

Scan's multipoint scanner is useful in process industry to measure and control any type of analog input, such as temperature from RTD or thermocouple sensors, mV inputs and mA inputs. Inputs such as mV and mA can be calibrated to any process value in engineering units by the user, eg pH, %, kg, etc. Also external linearisation facility is provided. Thus the unit can be used to measure any process value without changing any hardware. Scanner has 8/16/24/32 channel analog input facility. Each channel is provided with one opto-isolated output. Scanner is designed to withstand in noisy industrial environment. The unit has 20 x 2 backlite LCD display and 16 keys membrane touch keyboard for programming the unit. Serial interface RS232C type and RS485

type for communication with PC. With RS485 as many as 99 scanners can be connected to a PC. Printer port is available to take hardcopy of process values. The unit is provided with nonvolatile memory and retains data recorded for not less than 11 years. Software for scanner is menudriven and user friendly. Type of input to each channel is programmable. High/low limits for each channel, tag names, display update time (1 to 250 secs) and baudrate for serial communication is user programmable. The unit can work in auto/manual mode.

For more details write to :

Scan Electronic Systems

1362, Audumbar Apartments,  
Sadashiv Peth

Pune, Maharashtra - 411 030.

## Computer-Based Multichannel Temperature Indicator-Control ler- Recorder

Chowdhry Instrumentation offers computer-based multichannel temperature indicator-cum-controller-cum-recorder. The equipment can be used to permanently record process temperature *versus* time continuously for quality control and statistical records. It has one or multi channels with temperature indication and control. A powerful software enables operator to select any standard pair of thermocouples. Depending upon selection, all channels of indication/controllers/recordings get automatically calibrated. The software enables setting individual channel for control/alarm. Temperature can be displayed continuously of one



or all channels. Also, one channel temperature indication in zoom form is provided. Lower and upper limit control points can be set for each channel ; multipoint control can be provided, and set furnace/load can be switched off in parts to achieve best control at final set point, avoiding frictional heating problems. Records of temperatures of one or all channel *vs* date and time gets automatically recorded in the computer and printed graph/curve of all or any channel can be received (even after a year by just specifying date) ; temperature may also be viewed digitally. Recording interval can be set from 15 sec to 30 min. No special graph paper is required. The equipment is also provided with timer/timers to switch on or off any part of furnace/load at set time ; and furnace or load can be set to start or switch off at any particular time, eliminating waiting period. Other features include ; menu-driven package, online help, channel skip facility, diagnostic programme for fault finding, status facility and easy-to-use software for rapid analysis of statistical records, helping improve product quality and saving time and power. Temperature indication/control recording has accuracy better than  $\pm 0.5^\circ\text{C}$ . Cold function compensation is built into hardware and linearisation of all inputs is software controlled. For more details write to :

Chowdhry Instruments Pvt Ltd  
110, Model Basti, New Delhi -  
110 005.

## Highly Base-Deactivated Silica HPLC Column

One of the biggest problems in HPLC has been the need to achieve absolute reproducibility from column to column and from batch to batch from one year to the next. Silica is an amorphous material, the structure of which by its very nature changes from one batch to another. Hypersil Elite C-18 from Chromatopak can solve this problem. The range of probes and tests carried out to determine the characteristics of this highly base deactivated material has been remarkable.

For more details write to :  
Chromatopak Analytical  
Instrumentation (India) Pvt Ltd  
Panchratna Apartments, 29-B,  
Jawahar Nagar  
Goregoan (West),  
Mumbai - 400 062.

## Waste Incinerator

Incineration is burning of waste material to ashes through

a combustion process at high temperatures. Among the wastes burnt in the incineration units, are hospital waste, household wastes, solid wastes, liquid wastes, toxic fumes, waste oil and sludges produced by various industries. MVS offers advanced technology incinerators for safe disposal of harmful wastes giving a clean environment. Incinerators feature a cost efficient high volume combustion box with high temperatures resulting in fast waste destruction ; high temperature refractory lining, stainless steel stack and environmentally friendly clean smoke emission and fully automatic fuel fired burners. The company offers complete incineration systems which are fully assembled before despatch. Therefore, site installation work requires minimum time. All units are supplied on turnkey basis with site installation and commissioning. MVS also provides technical expertise for trouble shooting and after sales service. Fuel fired incinerators are available in capacities from 10 kg/hr to 500 kg/hr. MVS also offers electrical incinerators for waste burning upto 50 kg/hr capacity.

For more details write to :  
MVS Engineering Limited  
E-24, East of Kailash,  
New Delhi - 110 065.



# RESEARCH ROUND-UP

## An Update on Microbial Food Enzymes

Food enzymes produced by genetically modified microorganisms have been used commercially for many years, particularly in advanced countries of North America, Europe and Japan. These enzymes are produced by the pure culture fermentation of carefully selected strains of microorganisms grown on steam-sterilised natural substances. Fermentation conditions and conditions during recovery of the enzymes should be carefully controlled to ensure GMP throughout the course of enzyme production.

The final product must meet the food grade quality criteria formulated by the GAO/WHO Joint Expert Committee on Food Additives (JECFA) and Food Codex. Major examples of microbial food enzymes are maltogenic amylase for production of maltose syrups (Starch Starke, 1984, 36, 405-11) ; a lipase from *Mucor miehei* for interesterification of fats (Lipids, 1988, 23 (7), 701-6) and acetolactate decarboxylase for maturation of beer (J. Bacteriol, 1990, 172 (8), 4315-21). Recently, researches at Novo Nordisk A/S and the University of Groningen (Denmark) have developed a novel enzyme called cyclodextrin glycosyltransferase (CGTase) from *Thermoanaerobacter*, an enzyme developed for producing cyclodextrins for technical applications. This new microbial enzyme will be introduced by Novo Nordisk in 1996 as a food

enzyme. The necessary safety evaluation for these enzymes have been completed and the results are being reported.

## High Incidence of Heart Ailments Related to Decrease in Consumption of Coconut

Eminent naturopath, Mr C. R. R. Varma, says that the high incidence of heart diseases in Kerala was related to decrease in consumption of coconut and coconut oil by Malayalees.

"If coconut oil is harmful as claimed by some doctors, the entire race of Malayalees would have disappeared as they had been using it for the last several decades", Mr Varma said in an interview to PTI.

Mr Varma said he had cured about 600 heart patients introducing coconut in their diet and saved them from the trauma of a by-pass-surgery.

He said the campaign against coconut was being carried on by certain interested groups. "We have embarked on a mission to convince people of the richness of coconut products. We organised about 3,500 treatment camps in the last 19 years, and the work started yielding results", Mr Varma said.

Describing the spread of naturopathic form of treatment as a silent revolution, Mr Varma

said the vagrant lifestyle of people was the cause of all major diseases. "Only the naturopath tells you the way to prevent fatal diseases like cancer, heart and kidney ailments".

He said vegetarianism was the basis of nature cure. "It is the only way to lead a disease-free life. People in the United States and Britain are slowly turning to vegetarianism", he said.

Stating that naturopaths were opposing only unnecessary surgeries, he said in most cases surgery was being done without much thinking. In such cases, it was nothing but an admission of failure of science, he said.

Besides proposing a change in the diet, the naturopath also prescribed cheap and simple medicines to patients, most of them to be collected from nature. Home treatment was being suggested in a majority of cases.

## Arsenic Contamination in Water - West Bengal's Experience

Drinking water in the seven districts-Malda, Murshidabad, Bardhaman, Nadia, Hooghli, 24-Parganas (North and South)-have been reported to contain about 0.20 milligram a litre. The World Health Organisation prescribes not more than 0.05.

Scientists from the School of Environmental Studies (SES) at Jadavpur University and the



School of Tropical Medicine, Calcutta, have been surveying the region for eight years. They have fully mapped the use of tubewells and the water in the seven districts.

People who use such water from tubewells for drinking and in cooking accumulate the chemical in the hair, nail, urine and skin. Most get spotted melanosis (raindrop disease), oedema, gangrene and skin cancer. Cancers of bladder and lungs too are reported.

More than 20,000,00 people have been found with arsenical skin lesions. The scientists say the numbers with sub-clinical symptoms will not be known until individual tests are done. The scientists have detailed their data and analyses in a research paper in a recent issue of the journal *Current Science*.

In West Bengal and neighbouring Bangladesh, geological studies done with boreholes have shown that sedimental layers are rich in arsenic. Scientists say while this is natural in many parts of the world, excessive dependence on groundwater (and subsequent rapid withdrawal) leaches out the arsenic.

In other similar regions, like in Thailand, local residents partially solve the problem by collecting fresh rainwater in huge cement containers. Rainwater serves them for 10 months in a year.

West Bengal and neighbouring regions get 200 cm average rainfall. It is mostly wetland and has expansive river basin which is flooded regularly. Experts say a proper watershed development plan for such regions must prioritise potable surface water. Groundwater must be the last option here.

In fact SES, along with the Council for Scientific and Industrial Research, has

developed filter tablets for removing arsenic from groundwater. The school has filed three patents on it, and has successfully tested it in the Industrial Toxicological Research Centre, Lucknow, National Test House, Calcutta and the Asia Arsenic Network in Japan.

## Jatropha Plant Extract to Generate Fuel

The Indian Institute of Chemical Technology (IICT) Hyderabad, has shown that an oil extract from the widely available *Jatropha* plant can generate a wide range of hydrocarbons as an effective fuel substitute.

In extensive laboratory tests, it was found that vegetable oils extracted from the seeds of the drought-resistant and all-season plant *Jatropha curcas* could be converted into petroleum products, using cheap metal oxide catalysts. The process was also found to be economically viable.

The result of experiments and viability report have been sent to the Ministry of Non-Conventional Energy Resources and plants are afoot to set up a demonstration plant.

Commonly known as wild castor plant, *Jatropha*, which grows virtually on any soil, including waste and marginal lands, has immense potential to yield an alternative fuel and meet growing energy demands of the country. The plant whose extracts are traditionally used for medicine, pesticides and cosmetics, would be ideal for revegetating vast stretches of wastelands in the country. It grows unattended on any soil, yielding about two tons of seeds per hectare, which could be

catalytically cracked to produce diesel, gases and kerosene.

The crude oil from *Jatropha* extract is easy to refine compared to natural petroleum. The process also generates a valuable by-product in the form of glycerol which has widespread industrial applications.

There is a growing awareness in developed countries about the need to switch over from petroleum products to vegetable oil products as energy alternatives since they are non-toxic, biodegradable and environment friendly.

Petroleum from vegetable oils will not require major infrastructure inputs such as development of port and handling facilities and extensive pipelines for transportation.

*Jatropha* planting could also generate employment in rural areas, and meet rural energy demands. The IICT process is of particular relevance to India which spends a whopping Rs 20,000 crore each year on importing oil. Domestic production meets only about 40 per cent of the demand.

Indigenous oil production has slumped since 1990-91, while the demand is growing at an annual rate of nine per cent.

The Washington-based World Watch Institute has estimated that India's oil reserves would last only for 20 years.

Experiments in Thailand include using *Jatropha* oil as fuel and improve its efficiency by overcoming the initial ignition problems.

Even the initial investment on growing *Jatropha* on 100 million hectares would be much lower than the oil import bill for one year, according to Dr Kaimal.



## Research Station for Ducks on Anvil

The Indian Council for Agriculture Research (ICAR) has cleared a proposal to set up a research station for ducks in Andhra Pradesh shortly, reports UNI.

This was disclosed by Andhra Pradesh Agricultural University Vice-chancellor Dr. M. V. Rao while addressing a two-day meeting of zonal research and extension advisory council meeting for 1996-97 rabi season which concluded recently.

Dr Rao stressed the need for improving cattle and buffalo for milk production besides poultry, fish and small animals for meat. He urged the farmers to interact with the scientists to identify research gaps and overcome problems regarding supply of quality seeds.

## Eastern Food May Fight Western Disease

The best protection against the top-two killers of the western world - cancer and heart disease - could be an oriental diet, according to a top UK nutritionist.

Oriental food not only contained little fat, but was rich in soy products which can help the body protect itself against the onset of both diseases.

"Soyabeans and other soy foods contain bioactive compounds which appear to mimic the action of Tamoxifen, a drug widely used in the treatment of breast cancer and also believed to prevent heart disease and osteoporosis". Consumption of soy products

might contribute to the exceptionally low rates of breast, colon and prostate cancer in countries such as Japan and China.

Soyabeans, soya milk and soy products contain bioactive substances known as isoflavonoids which had a weak oestrogen effect on the body. Just as Tamoxifen, they worked to stop oestrogen acting on the breast where it could cause cancer, yet maintain the oestrogen levels needed to prevent heart disease and osteoporosis.

There was a controversy over whether women with a family history of breast cancer should take Tamoxifen to protect themselves because use of the drug - while highly effective against breast cancer - increases the risk of cancer of the lining of the womb.

## Chemical-free Cultivation is the Face of the Future

Coated and scarred by chemical residues - a result of indiscriminate spraying, the farm produce we eat turns our belly into a repository of deadly chemicals.

Harmful pesticides like DDT, malathion, BHC, are found in all kinds of food. It is estimated that approximately 0.27 mg chemical found in food eaten by an average Indian every day-gets collected in the human body in tissue, bloodstream, even breast milk which in turn can cause multitudes of ailments like cancer, kidney stone, blindness, limb deformity, asthma etc.

The Institute of Cultured Research and Action (ICRA)

(established 1991) in Bangalore is diligently pushing forward with ideas and actions to weed out the chemical culture that has come to dominate our agriculture.

ICRA, working in loose association with marginal farmers, is trying to give a new face to the green movement with special emphasis on the three Rs: reuse, reduce and recycle.

Recently, Koramangala based NGO ACTS Ministries have launched a pilot project in collaboration with AME (Agriculture Man and Environment) to grow vegetables organically on their farms in Rayasandra on Hosur road. AME has worked out different patterns for growing vegetables in a pest-free situation.

They have their first experimental harvest in a couple of months, when their organically grown vegetables would be initially available to a limited number of customers. The vegetables will be widely available once the project is extended to the village farmers.

## How Weeds can Help Food Crops Bloom

Humble weeds - the bane of gardeners the world over - could become a boon for farmers and save the world from starvation in the coming century, an Australian scientist working on plant genetics has predicted.

The challenge would be to find the genes that make weeds grow so well and transfer them to food crops, says Dr Jim Peacock, head of the state-run CSIRO Research Agency's plant industry division.

"We have to double world food production by 2025 or 2030 because the population of the world will be demanding that



much more food," he said. We need to be able to understand why weeds are such aggressive plants.

Dr Peacock is heading a team of Australian scientists working on a 12-nation programme to map out the genes of a tiny weed called *Arabidopsis*, or thale cress, picked because of its genetic simplicity.

The researchers are trying to find out why weeds are so good at utilising water and nutrients. May be it is because they hold their leaves in the right way to make use of the sun or may be they have very efficient ways of producing lots of seeds.

Dr. Peacock said that weed genes could be used to toughen food crop plants or enable crops that now need warm climates to be grown successfully in colder areas.

## Chemistry of Mad Cow Disease

In the panic about BSE (bovine spongiform encephalopathy, or "mad-cow disease") that is currently sweeping Europe, the scientific weirdness of the disease has, perhaps understandably, been buried.

Until recently, it was accepted in biological dogma that anything that reproduced (including any infectious agent) needed nucleic acid—either DNA or, at a pinch, RNA—to carry its genes for it. The agents of BSE, though, appear to be pure proteins.

These agents are known as prions. They are twisted forms of a protein found on the surface of mammalian nerve cells. Something about the shape of the twisted proteins seems to

mean that they can gang up on ordinary ones and twist those, too, out of shape, thus stopping them from working.

If this was just a freak associated with a specific type of protein in one particular group of animals, it would scarcely matter in the grand biological scheme of things. But research just published in *Science*, by Susan Lindquist and her colleagues at the University of Chicago, suggests that it may be more common than many biologists would like to admit. It also hints at a treatment.

Dr Lindquist working on yeast said that yeast cells also are afflicted with prions. In this case, the protein involved is known as sup 35. In its healthy form, it helps translate DNA into proteins by telling the ribosome—the apparatus in which proteins are assembled—when to stop putting a protein together.

Proteins are assisted in the process of folding into the correct shape by other proteins known as chaperones. Dr Lindquist has found that if she forces *PSI* + cells to make more of a chaperone known as Hsp 104 than they would normally do (a process known as over-expression), they become healthy again.

The extra chaperone seems to be enough to encourage the perverted sup 35 to revert to its normal shape.

Until now, no one has ever cured a prion-affected organism. To prove that a new one, albeit humble, exists and at the same time to cure it, it is impressive.

## Method to Detect Organisms in Food

As a technique of value to the food industry, dielectrophoresis can be used to move micro-organisms either towards or away from a region of high electric field strength.

Recent work in this field has shown that the way towards its being accepted as a suitable alternative to the classic cultural-based microbiological techniques which are seen as time-consuming, labour intensive and often cumbersome.

Other methods for the detection of micro-organisms in food now being used are more rapid, but generally lacking in sensitivity.

Dielectrophoresis is defined as the motion of a neutral particle due to the action of a non-uniform field on its permanent or induced dipole moment. The technique offers speed and simplicity and the separation of microorganisms is achieved within minutes by the application of an appropriate electric signal.

Other advantages are relatively low capital cost and, because it is a generic concentration technique and it can be used with a wide range of rapid detection systems.

## No More Tooth Decay

There is good news for those who kept away from sweets and crunchy chocolates for fear of tooth decay. Thanks to the researchers from Australia, a new anti-decay agent will soon be added to tooth paste, food



## RESEARCH ROUND-UP

materials and confectionery to prevent their harmful effects on tooth.

Called Anti-cariogenic Casei Phosphopeptide (ACPP),

which is a protein derived from milk, it is the only agent other than fluoride to check caries (decay of teeth). According to *Australian Science and Technology*

newsletter, the product is about to be marketed internationally by a leading Australian milk products company.

## OBITUARY

We record with deep regret the sad and sudden demise of **Prof. A. Sreenivasan** on July 20, 1996 at Bangalore. He was 87.

His pioneering research in Biochemical and Food Technological Research in India, spanned over 5 decades specially in the areas of enzymology and nutritional biochemistry, molecular biology, genetics, etc. After a brilliant academic career, he joined the Agricultural Research Centre at Indore for a brief period and then UDCT of Bombay University. He laid the foundation for radiation preservation of foods at BARC and developed it into an excellent centre of multinational repute.

During his long period of R&D activities, he had the distinction of having been associated with a number of national and international institutions like CFTRI, Mysore, BARC, Bombay Cancer Research Institute, Bombay; Williams Waterman Foundation of USA, etc. His urge for research work is well known. His urge for research work is well known. He had to his credit over 500 research publications in a wide spectrum of biochemical and food science areas. A brilliant teacher, he was able to motivate those working with him. As many as 50 students completed their Ph.D. under his guidance. He had nurtured the careers of hundreds of students and colleagues. He had travelled far and wide and visited several R&D institutions in India and abroad. Awards and honours in recognition of his scientific achievements came in large numbers to him. To name a few important ones, Fellow of the National Institute, Rafi Ahmed Kidwai Memorial Prize, B.C. Guha Award, Fellow of the AFST(I) and above all the coveted National Award PADMA BHUSHAN.

His death is an irreparable loss to the entire scientific community and has created a void which is difficult to fill.

The Association of Food Scientists & Technologists (India) deeply mourn the death of **Prof. A. Sreenivasan** and convey their condolences to the bereaved family.



# TRADE FAIRS & CONFERENCES

## Global Fisheries Meet in March '97

In a BID to attract public attention towards the "reckless plunder of the seas by the large industrial fleets" and to influence public opinion against the over exploitation of fisheries resources, fishermens' organizations from different parts of the world will converge in New Delhi for a World Fisheries Meet in March 1997.

The three-day meet, which will start from March 3, will bring together all the small fish harvesters in the world.

India will be represented by the National Fishworkers' Forum, headed by Father Thomas Kochery.

The meeting will bring together fisheries workers from several countries of the world, including Canada, Chile, Senegal and the Philippines.

For the first time, the small fish harvesters would try to form an international network against global industrial fleets engaged in fisheries, according to Father Thomas Kochery.

At present, the total number of such vessels is estimated at 25,000.

The meeting assumes significance in the context of the ongoing struggle of the fisheries workers in the country against the government policy of allowing the operation of deep-sea fishing trawlers in the Indian ocean.

Though several expert committees have recommended the cancellation of the licenses

issued to these industrial fleets, the government is yet to take a decision in the matter.

An international meet organized by the Canadian Council of Professional Fish Harvesters in October last year pointed out that 70 per cent of the world's marine fish stocks were at the limits of exploitation or depleted, and that such a situation posed serious nutritional problems for millions of people.

Quoting FAO data, the organizers of the meeting said that still, small-scale fish harvesters accounted for 50 per cent of the world's fish production.

The meeting emphasized that the small-scale fish harvesters, who had a long-term social, cultural and economic dependence on fish resources, were being squeezed out of existence by the huge, industrial vessels.

According to Father Kochery, the Indian ocean is the last area where fish stocks have not been over-exploited.

The New Delhi meet of fisheries workers would mobilize international support for the fight to protect the fisheries resources of the world, especially those of the Indian ocean, he added.

## Expert Meet on Food Insecurity

Experts from various parts of the world provided glimpses into the process that are leading to growing insecurity of food on the inaugural day of a two-day

meeting on "Globalization, food security and sustainable agriculture," organized by Delhi-based Research Foundation of Science, Technology and Natural Policy, Malaysia-based Third World Network and Delhi-based non-governmental organization, ACTIONAID. Ms Vandana Shiva is the director of this foundation.

Food insecurity is building up all over the world due to the lack of access, dwindling public food reserves, marginalisation of small farmers by the increasing corporatisation of agriculture and gradual freeing of national controls on global food trade, experts feel.

For instance, in India, the percapita food consumption has declined from 510 gm per day in 1991 to just 466 gm per day in 1993. This could be directly attributed to the increasing domination of market forces in the food sector and reduced public policy intervention for food security which resulted in 63 per cent rise in food prices between 1989-90 and 1993-94, according to Vandana Shiva.

Take the case of the UK 'Once considered the world's richest nation, today one-fifth of UK's population has been officially classified as those unable to access health enhancing diets, says British food policy expert, Tim Lang. In fact, the access is further restricted by availability of transport because one has to drive an average 8 km to find a supermarket that sells food, says Mr Lang, professor at the Centre for Food Security at the Thames Valley University, London.



# PEOPLE

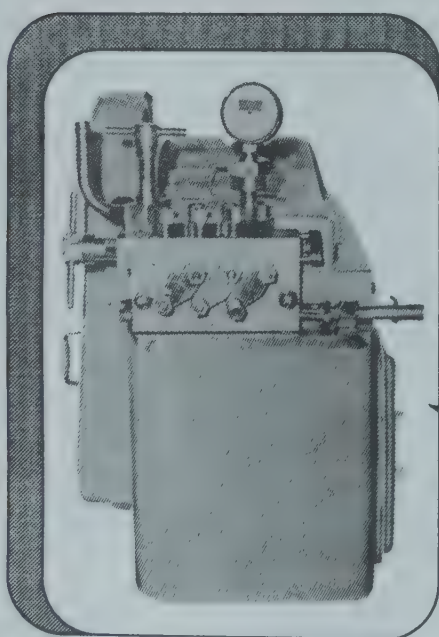
**Ms Damindra Dias,** former executive of Kellogg India will take over as Deputy Director, Finance Coca-cola's India operations. Before she became Kellogg's Country head,

Dias was incharge of the Company's finance function.

**Mr. A. P. Murugan,** has been elected as the Vice-chairman of the Spices

Board for a period of one year. Mr. Murugan represents the Spices Board in the capacity of exporter and is from the chillies Export House, Virudhunagar, Tamil Nadu.

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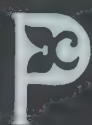
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## Scientists to Come Under "Social Auditing"

Union Agriculture Minister Chaturanan Mishra said that the United Front Government would undertake 'social auditing' of scientists in institutions under the Indian Council of Agricultural Research (ICAR) and agricultural universities.

The Ministry has chosen 11 disciplines and for each, there would be a committee comprising one agricultural scientist, one agricultural economist, one member of Parliament, one member of Assembly and a few Commissioners.

These committees would oversee the concept of "lab to land accountability" in all 90 institutions under ICAR and 260 agricultural universities all over the country, he stated.

He told the scientists that this accountability was inevitable now as the fund allocation for research and development would increase substantially in the near future to meet the challenges of the economic reforms and liberalisation policies.

## Food Poison Scare Grips Japanese

The number of people stricken in Japan's mysterious food-poisoning outbreak climbed to 8,500.

Seven people had died and more than 600 were hospitalised, scores of them in critical or serious condition. In almost every region of the country, people have now contracted the baffling illness, blamed on an *E. coli* bacterium known as 0157, which begins with fever and diarrhoea and for some people progresses to kidney damage and even death.

Television commentators, newspaper editorials and cartoons have begun to blast national Government officials and local officials in Sakai, the city where about three-quarters of the victims live. One cartoon in Thursday's Asahi Shimbun, for instance, shows the Government riding a huge snail as the food poisoning epidemic swirls around it. A Yomiuri Shimbun editorial states that the crisis was allowed to escalate because local school officials took the problem "too lightly" and did not recognise the crisis.

"If the Government had done their job, this would not have happened," said Takahiko Marumoto, a resident of Sakai. "Failure to know what to do when a big problem presents itself is a chronic problem with the Government."

Marumoto is so worried that he has evacuated his wife and 2-year-old daughter from Sakai until more is known about the poisoning.

Hashimoto set up a Cabinet task force to deal with the crisis. The panel is expected to order operators of meat-processing plants to check the sanitation of their operations. *E. coli*, which has been responsible for several deaths in the United States in recent years,

is frequently carried in undercooked meat.

It is relevant here that the United States recently adopted new meat-inspection standards that require regular laboratory checks for *E. coli*, *salmonella* and other bacteria. But Japan still relies on visual inspections in slaughterhouses and requires no Government inspections in meat-processing plants.

Health officials are not sure of its source or how it spreads. The overwhelming number of those affected are children, many of whom are believed to have been poisoned by school lunches.

World Health Organization, whose officials say that they are increasingly concerned about the outbreak, has warned Japanese citizens that the bacteria can be passed through human contact, such as faecal contamination among small children.

## Karnataka to Announce Food Policy in October

A comprehensive food policy will be announced for Karnataka by the first week of October, according to the state's minister for food and civil supplies, Mr. G. Basavanappa, who said that the policy would cover all aspects, including the levy policy (a minimum of one lakh tonnes of rice was going into the pool at present) and the distribution system.



# PATENTS AND FOOD LAWS

## CSIR Plans Nationwide Patent Literacy Tutorial

With patents regime and intellectual property rights (IPR) protection gaining significance of late, the Council for Scientific and Industrial REsearch (CSIR) has planned a nationwide tutorial programme for better patent literacy shortly.

According to CSIR Director-General, R. A. Mashelkar, who believes in absolute protection for patents, there are several false notions about patent protection which ought to be eradicated through proper purveying of information.

CSIR, which proposes to reorient management of its research activities, will also suitably modify its own research policy to eliminate efforts of reverse engineering through encouraging a standard record book system and creation of screening committees to search for patentable material before research papers are published.

According to the National Institute of Scientific Studies and

Technology (NISSAT) Adviser, Abhijit Lahari, moves are afoot towards conducting training courses on writing of patenting reports to build patent consciousness and process of preparing case studies to make patenting more easy.

Meanwhile, Government of India's Bangalore-based Research and Development Institute, Central Manufacturing Technology Institute (CMTI), has set up a value-added patent information service (VAPIS). It is the second one of its kind in the country, with a similar patent information centre already in place at National Chemicals Laboratory (NCL) at Pune.

While NCL will impart detailed information on chemical patents, CMTI's VAPIS is expected to provide an understanding of technological trends, help in predicting future developments and avoid duplications in research and development, besides solving problems associated with intellectual property rights (IPR).

According to Dr Mashelkar, the Centre is providing Rs. 50 lakhs for the VAPIS project and hoped CMTI will become self-sufficient by

charging fee for the services offered.

He hoped that CMTI would also network with other scientific institutions in Bangalore. Such VAPIS are being planned for drugs, food and leather and such services, among other things, which will give the full text, prepare detailed literature on technology and status report and have active linkages. So much so, that while the Lucknow-based, Central Drug Research Institute (CDRI) will disseminate data on patents related to pharmaceuticals, the Mysore-based Central Food Technological Research Institute (CFTRI) will focus itself on those related bio-technology.

## Indian Standards Withdrawn

Bureau of Indian Standards has withdrawn the following Indian Standards, as the products are not being produced in the country :

IS No :	Title
13480 : 1992	Lawn and garden ride on (riding) tractors-Drawbar
13481 : 1992	Lawn and garden ride-on (riding) tractors - Three point hitch
13482 : 1992	Lawn and garden ride-on (riding) tractors-One point tubular sleeves hitch.
13483 : 1992	Lawn and garden ride-on (riding) tractors-Power take off.
13639 : 1993	Power lawn...mowers, lawn and garden tractors, professional mowers, and lawn and garden tractors with moving attachments - Definitions, safety requirements and test procedures
IS 8700 : 1977	Basic requirements for a stall for sale of meat of large animals, standards withdrawn as — this standard has been superseded by IS 7053 : 1996.
IS 6460 : 1980	Technical requirements for ball and socket assembly for three-point linkage (first revision) stands withdrawn as Dimensions are covered in IS 4468 (Part I) : 1995.



# RAW MATERIALS

## Scheme to Boost Vegetable Production in J&K

Despite its rich bio-diversity and varied agro-climatic zones, Jammu and Kashmir is deficient in vegetable production with the result that local requirements are being met by supply of vegetables from outside the State.

In order to bridge the gap between production and consumption of vegetables in the State, the Government has chalked out a comprehensive programme for boosting vegetable production in a phased manner. The Eighth Five year plan envisages increase of crops in the traditional vegetable-growing areas, bringing new areas under vegetable cultivation, encouraging distribution and growing of hybrids of some of the important vegetable crops. More attention is to be paid to seed production for crops like tomato, cabbage, knol-khol etc., and ensuring availability of seeds both for local use and export which, in turn, will help in increased productivity of various vegetables.

The Department of Agriculture also intends to encourage and popularize kitchen gardening by providing sufficient number of vegetable seedlings to the needy growers by raising these in the hot-beds in poly houses.

During the last two years, a number of farmers have been encouraged to take to vegetable cultivation in Jammu and the experiment has yielded good results, compared to traditional crops.

Even the Ladakh region of tough terrain and adverse climatic conditions is marching ahead in vegetable cultivation. Over 2000 green houses have been set up in Leh and Kargil districts of Ladakh region, while 7000 such houses are being set up during the current year.

The State Government has also formulated a plan to undertake the vegetable cultivation in six districts of the Valley. The Chief Agriculture Officers have been asked to prepare district-wise plans and submit feasible reports as early as possible. Efforts are under way to take up vegetable cultivation in the Valley in an organized manner from the current year, on a priority basis.

To popularize vegetable cultivation and demonstrate related activities like processing and canning of dried vegetable and pickle etc., a vegetable show was recently organized in Jammu in collaboration with the Agriculture Directorate, Regional Research Laboratory, Sher-i-Kashmir University of Agriculture and the local farmers. If the present tempo and enthusiasm for large scale vegetable cultivation is maintained, the State will soon be self sufficient in vegetable production.

## Rains Affect Soybean Cultivation in M.P.

Several districts in Madhya Pradesh are hit by floods following heavy rains that lashed the State this season. Vast stretches of cultivated fields have been inundated. Agricultural operations have come to a standstill in the flood-affected areas. Malwa region was the worst affected.

The incessant downpour and disruption to farming follows a weak onset of the south-west monsoon over the State and prolonged dry spell for about four weeks. Lack of precipitation had posed a threat to oilseeds and pulses crops that had been sown. The dry spell was broken in the second week of July ; but what followed was worse, according to farm experts.

Soybean cultivation is likely to be seriously affected. Madhya Pradesh has been declared as a soybean State, as it contributes over three-fourths of the country's soybean output.

According to Mr. Davish Jain, Chairman of the Indore-based Soybean Processors' Association of India (SOPA), the target of 50 lakh tonnes of soybean production for the crop year 1996-97 will not be achieved. He said that his association was closely monitoring the situation. Declining to hazard a guess on the acreage for soybean, Mr. Jain said that a survey would be conducted after the rains abate and fields become accessible.



## RAW MATERIALS

In a meeting with The Union Minister of State for Commerce, SOPA has sought permission for import of soybean. The association apprehends a fall in production of the oilseed this kharif, as a result of unfavourable weather and possible low productivity due to late sowing.

SOPA has pleaded that duty-free import of soybean might be permitted. It would result in capacity utilization in the processing industry. It would also ensure continuity of soyameal exports even while augmenting soya oil supplies.

There are over 150 soybean processing plants in the country with an installed capacity of nearly 135 lakh tonnes. Soybean production

during 1995-96 was 44.5 lakh tonnes as estimated by the trade.

During 1995-96 soymeal exports amounted to 24.5 lakh tonnes by volume and Rs 1,725 crores by value, accounting for 70 per cent of aggregate exports of the oilseeds and products sector.

### Apples from HP

Chemically treated and coloured apples have been pushed into the market in Delhi and other places all over the country in large quantities by growers from Himachal Pradesh. The objective is to make a fast buck when the prices of the fruit

are higher. The treated apples are considered harmful.

Though a final word on the exact harm that the chemical hormones used by the growers for fast ripening of the fruit is yet to be announced, concern is already been expressed by various quarters in this State at this unhealthy trend.

Well placed sources engaged in the production and marketing of the fruit, for which Himachal is known as the Apple State of India, say that many growers in the State were now commonly using "Ethofon" spray to faster the ripening effect in the apple produce. The use of this hormone brings the colour in the apples much faster than the natural way.

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## **Trends in Food Science and Technology (Proceedings of IFCON - 93)**

Association of Food Scientists and Technologists (India) is happy to announce the release of its much awaited and prestigious publication of the Proceedings of the Third International Food Convention (IFCON-93), held at Mysore during 7th-12th September 1993. The volume entitled "**Trends in Food Science and Technology**" constitutes edited versions of 145 research/review papers presented by eminent authors who are experts in their respective areas of research at 24 symposia. The publication (ISBN 81- 900556-0-7) covers a broad spectrum of information in the form of articles of current interest in Food Science and Technology on Policy Issues, R&D Management, Agro Development, Research & Development Trends, Technology Transfer, Emerging Technologies, Biotechnology, Human Nutrition, Foodgrain Storage, Foodgrain Processing of Wheat and Rice, Fruit and Vegetable Technology, Plantation Products, Oilseeds, Animal Products, Milk Products, Traditional Foods, Convenience Foods, Street Foods, Packaging Material, Thermal Processing, Food Quality Assurance, Safety and Standards, Human Resource Development, Waste Disposal and Control of Environmental Pollution.

The publication is intended to serve as a standard reference volume for all those interested in Food Science and Technology and also in allied disciplines. The book is hard bound and laminated.

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and demanding consumer....



Organoleptic preceptions - more particularly taste will continue to be the driving force in acceptance of a new food product in market place. High quality and high performance flavours promote innovative new food product ideas and satisfy unique process and product demands. In addition - provide to variety, consumer appeal and ultimately consumer acceptance into processed foods.

At Food Ingredient Specialities - We have achieved a quantum leap and professional expertise and are committed to providing flavours of high functionality and excellent taste attributes to processed foods. We are continuously capturing nature's experience. This is a continuing commitment to work closely with user industry to bring about the

best into processed food products, viz., - Soft drinks, Fruit and vegetable products, bakery products, confectionery, Dairy products including ice creams, snack foods and others. We are committed to consistent quality, responsive service and on-time delivery.

Experience the expertise ....



**FOOD INGREDIENT SPECIALITIES PRIVATE LIMITED**

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